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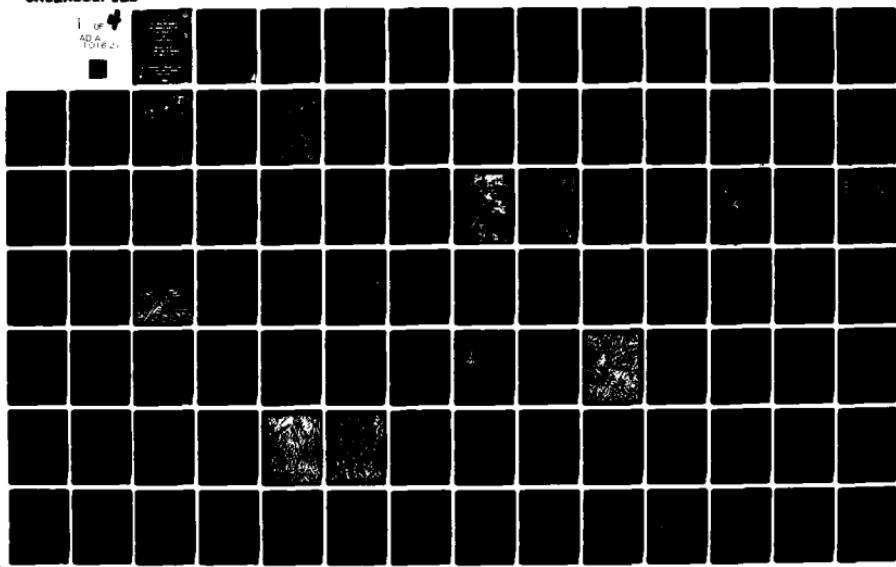
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A CULTURAL RESOURCES RECONNAISSANCE OF FIVE PROJECTS IN PUERTO RICO — ETC(IU)
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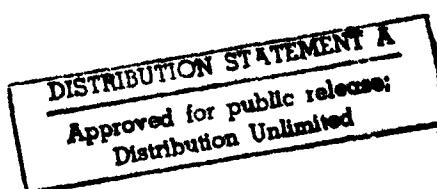


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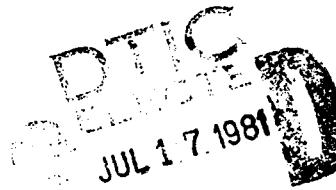
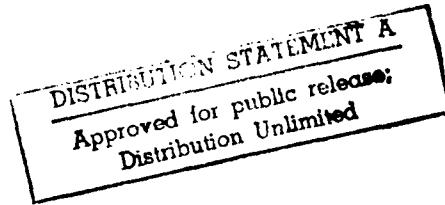
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Appendix B Ethnohistory and History of Puerto Rico:
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Appendix C A Standing Structures Reconnaissance:
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A CULTURAL RESOURCES RECONNAISSANCE
OF FIVE PROJECTS IN
PUERTO RICO

INTRODUCTION

AUTHORITY AND PURPOSE

The cultural resources reconnaissance reported here is a segment of the continuing compliance procedures of the U.S. Army Corps of Engineers. The pertinent authorities for this work are the National Environmental Policy Act of 1969, the Historic Sites Act of 1935, the National Historic Preservation Act of 1966, and Identification and Administration of Cultural Resources which is Engineer Regulation 1105-2-460.

To comply with these Federal laws and regulations, the Jacksonville District, U.S. Army Corps of Engineers, requested the Mobile District to perform a cultural resources reconnaissance of the five project areas. The explicit purpose of this effort is to detail the potential for the location of cultural resources within the project area which may be eligible for the National Register of Historic Places. As detailed below in Recommendations, several areas of concern were located during this reconnaissance.

DEFINITIONS

Definitions, as used in this report, are from ER 1105-2-460.

Cultural resources

Any building, site, district, structure, object, data, or other material significant in history, architecture, science, archeology, or culture.

Cultural resources reconnaissance

A literature search and records review, plus an on-the-ground surface examination, of selected portions of the area to be affected, adequate to assess the general nature of the resources probably present and the probable

impact of alternative plans under consideration. For archeological reconnaissance, test excavations may be required at some sites so that evaluations may be adequately accomplished. This level of investigation is appropriate to preliminary planning decisions and will be of assistance in determining viable alternative plans in feasibility studies during General Investigations. Normally, a reconnaissance level investigation will not yield information of adequate scope to serve as the basis for requesting determinations of eligibility for the National Register of Historic Places.

Cultural resources survey

An intensive, on-the-ground survey and testing of an area sufficient to determine the number and extent of the resources present, their cultural and scientific importance, and to estimate the time and cost for preserving, recovering, or otherwise mitigating adverse effects on them. This level of investigation is appropriate when the project has been authorized and finally formulated, and will thus be accomplished during the Phase II GDM stage of project planning. A survey level investigation will result in data adequate to determine resource eligibility for the National Register of Historic Places.

The State Historic Preservation Officer was contacted and provided information on sites within each project and on or being prepared for nomination to the National Register of Historic Places. This information is incorporated within the text.

In accordance with Section 6c of ER 1105-2-460, precise locations of archeological sites have not been included in this report.

RIO PUERTO NUEVO

ENVIRONMENT

There are a number of major environmental factors which serve as major determinants in the distribution of cultural resources on the landscape. In the northern coast area of Puerto Rico, the primary factors are geology, soils and hydrology and vegetation. In the sections below, we will deal with each of these environmental factors as they relate primarily to prehistoric site location and prediction.

Geology

The project area lies within the Northern Coastal Plain physiographic province of Puerto Rico (Lobeck 1917). The major geologic features of this province are detailed in that report. These features basically consist of two major units: an older Tertiary unit probably of lower Miocene age consisting of a series of unconsolidated limestones which are presently represented by hillocks which are remnants of a once extensive system; and a younger Quaternary primarily alluvial unit. In the southern extreme of the project area the Tertiary and Quaternary units are lying unconformably on a much older, possibly Paleocene, unit of sedimentary and volcanic rocks, whose local topographic expression can be seen in the Montes de Hatillo. Semmes has described the character of the Tertiary limestone belt which stretches across the northern coastal plain of Puerto Rico as follows:

...the topography of the coastal plain consists of numerous isolated or closely grouped angular hills not exceeding 100 feet in altitude, but of such angular and rugged outline, and so densely covered with tropical vegetation that they form the most inaccessible and impassable regions of the (San Juan) district. Slopes of 40° are quite common and occasionally vertical faces of limestone rising 10 or 20 feet are to be seen. Though from a distance they appear well rounded, yet from a distance (SIC) (presumably yet closeup) they are exceedingly rough and jagged, and are, as one of the Americans living in the vicinity expressed it, "very hard to scramble up."

MUNICIPALITY OF SAN JUAN - 1963

GENERAL PROJECT AREA

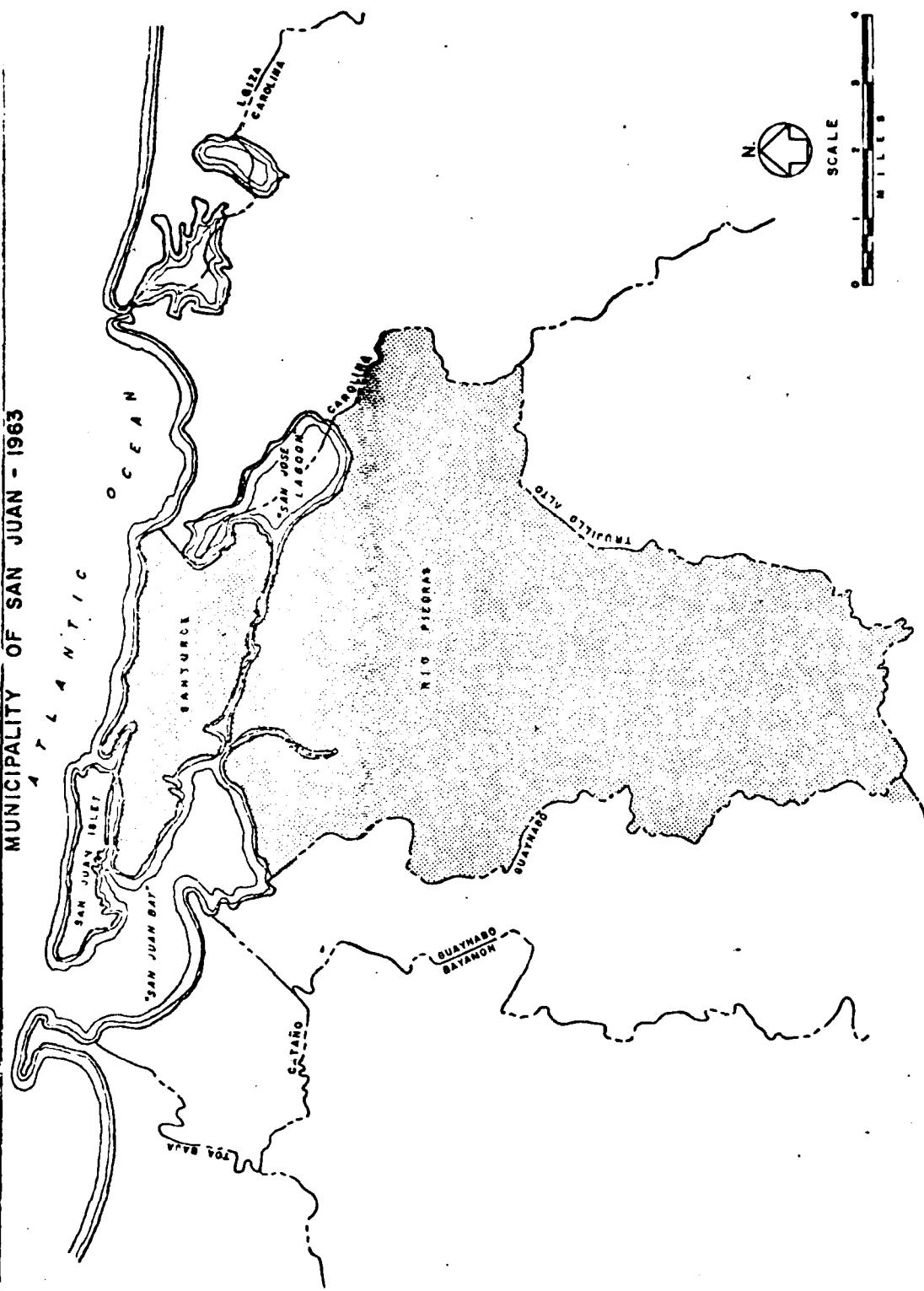


Figure 1. Rio Puerto Nuevo-Rio Piedras Basin.

These topographic expressions of the Tertiary unit have been referred to in the geologic literature variously as "haystack hills" or pepino hills (Semmes, 1918). These hills represent the undissolved remnants of the once extensive Tertiary limestone system. Subsurface dissolution of the limestone produced an extensive system of caverns which through the ages have caved in leaving in their wake the conical hills as residuals. West of San Juan the hills are extremely numerous and densely packed, but as one moves eastward "the formation undergoes gradational lithologic changes" and in the northeastern part of the island "they are found in widely scattered patches that rise as isolated conical hills or hill clusters, the bases of which are buried by overlapping lagoonal and fluvial deposits of recent origin" (Meyerhoff, 1936). The Tertiary formation is present in the immediate vicinity of the project area in two places: (1) the group of hills between San Juan harbor and Bayamon clustering primarily around the Fort Buchanan area; and (2) the cluster around San Jose Lagoon (Meyerhoff, 1936). All of these outcrops are generally very cavernous, contain many overhangs which can serve as rockshelters, and in many instances, as is evident in the Fort Buchanan area in the Montes de Caneja, the poorly consolidated materials have yielded, creating in the process many large fissures and crevasses which in themselves represent artificial cave systems. As will be noted later, these features are one of the primary loci of prehistoric cultural remains in the north coast of Puerto Rico.

The Quaternary units are also important in determining site locations. They consist primarily of an older alluvial unit of Plio-Pleistocene age overlain by a variety of Pleistocene to Recent sediments including littoral deposits such as eolinite, bay muds, floodplain alluvium, cemented beach rock and recent beach sands, and finally recent fill. The latter is much in evidence in the immediate vicinity of the Puerto Nuevo.

Soils and Hydrology

The soils in the project area are encompassed by two major soil associations. In the northern part of the project area, comprising the region from

Canal Margarita to San Juan Bay, the soils are mostly hydraquents of the Martin PenaSaladarHydraquents association. These soils are generally deep, nearly level, very poorly drained soils located in low depressions and surrounding lagoons (USDA, SCS, 1978). In the southern part of the project area, the soils are mostly those of the ToaBajuraColoso association. These soils are characterized by SCS as deep, nearly level, well drained to poorly drained soils on floodplains. Figure 2 shows the mapped soil units in the project area.

In view of the tremendous amount of development and urbanization in the project area, it was felt that cultural resource concerns should be primarily directed toward those portions of the project which have been subjected to the least disturbance. Three major areas were targeted for investigation: (1) The land currently being developed as Las Americas Park, south of the Hiram Bithorn Stadium, (2) the area comprising the Agricultural Experimental Station and Botanical Gardens, and (3) the northern part of the project area encompassing the land north of Margarita Canal and the diverted Rio Puerto Nuevo. The latter area consists primarily of hydraquents and made land, while the former two are included in the ToaBajuraColoso association. The Las Americas Park area consists primarily of soils of the Bajura series which are mostly fine clays. A small portion along the north bank of the Rio Piedras, south of the Stadium is mapped as part of the Toa series, along with a long stretch along the Rio Piedras in the area of the Experimental Station. The Toa soils are mostly silty clay loams located on floodplains and are generally well drained. The typical Toa profile is described in Table 1. This profile is in an area within the immediate project boundaries and was taken from the bottoms fringing the Rio Piedras immediately south of the entrance to the Experimental Station. Another unit of concern which is mapped within the potential project area is mantled with soils of the Vega Baja series. These soils are generally poorly drained silty clays located on terraces and alluvial fans. The unit of concern is wholly within the Agricultural Experiment Station and the typical profile taken from this unit is shown in Table 2.

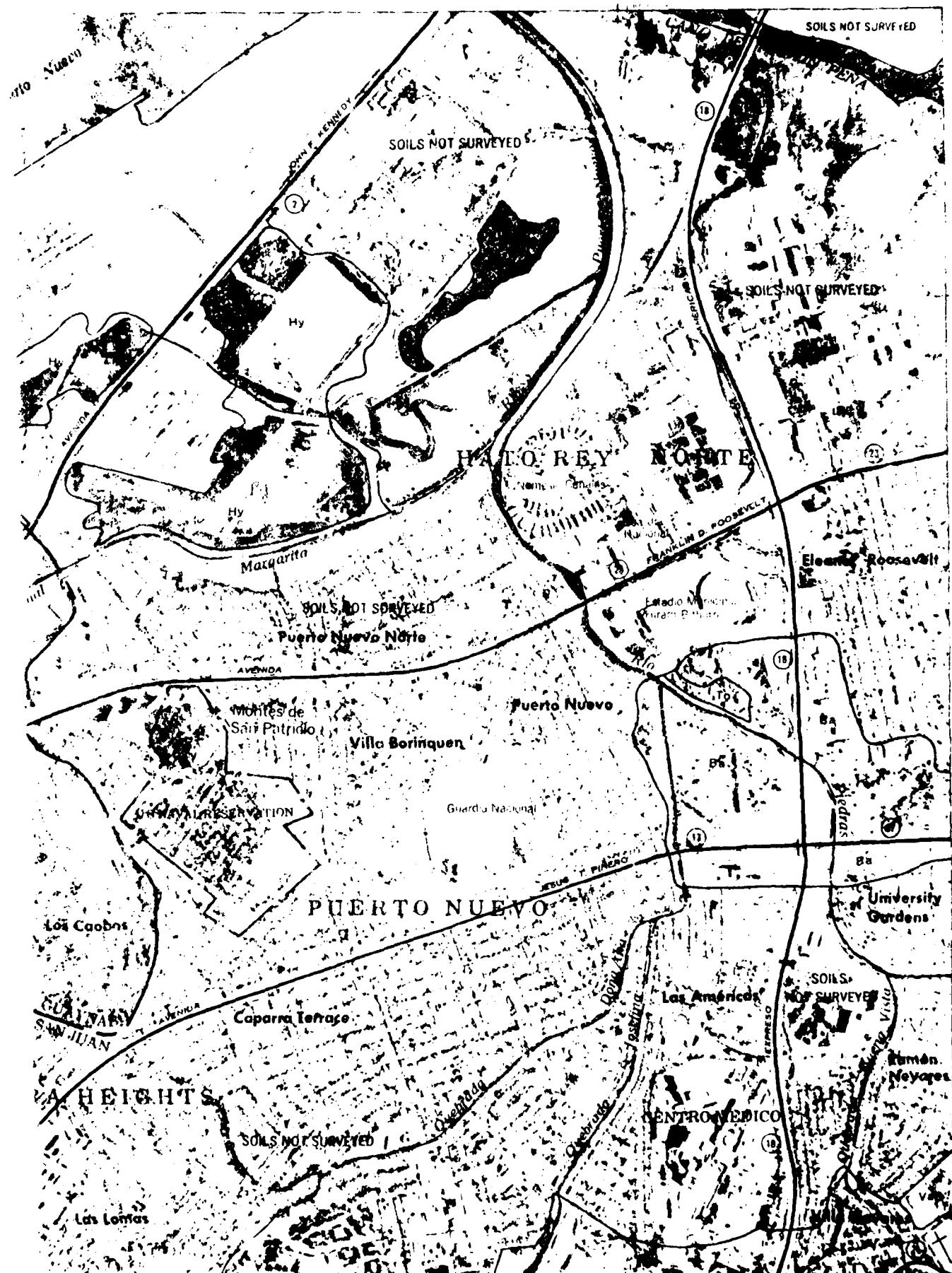


FIGURE 2. Soils of the Puerto Nuevo.

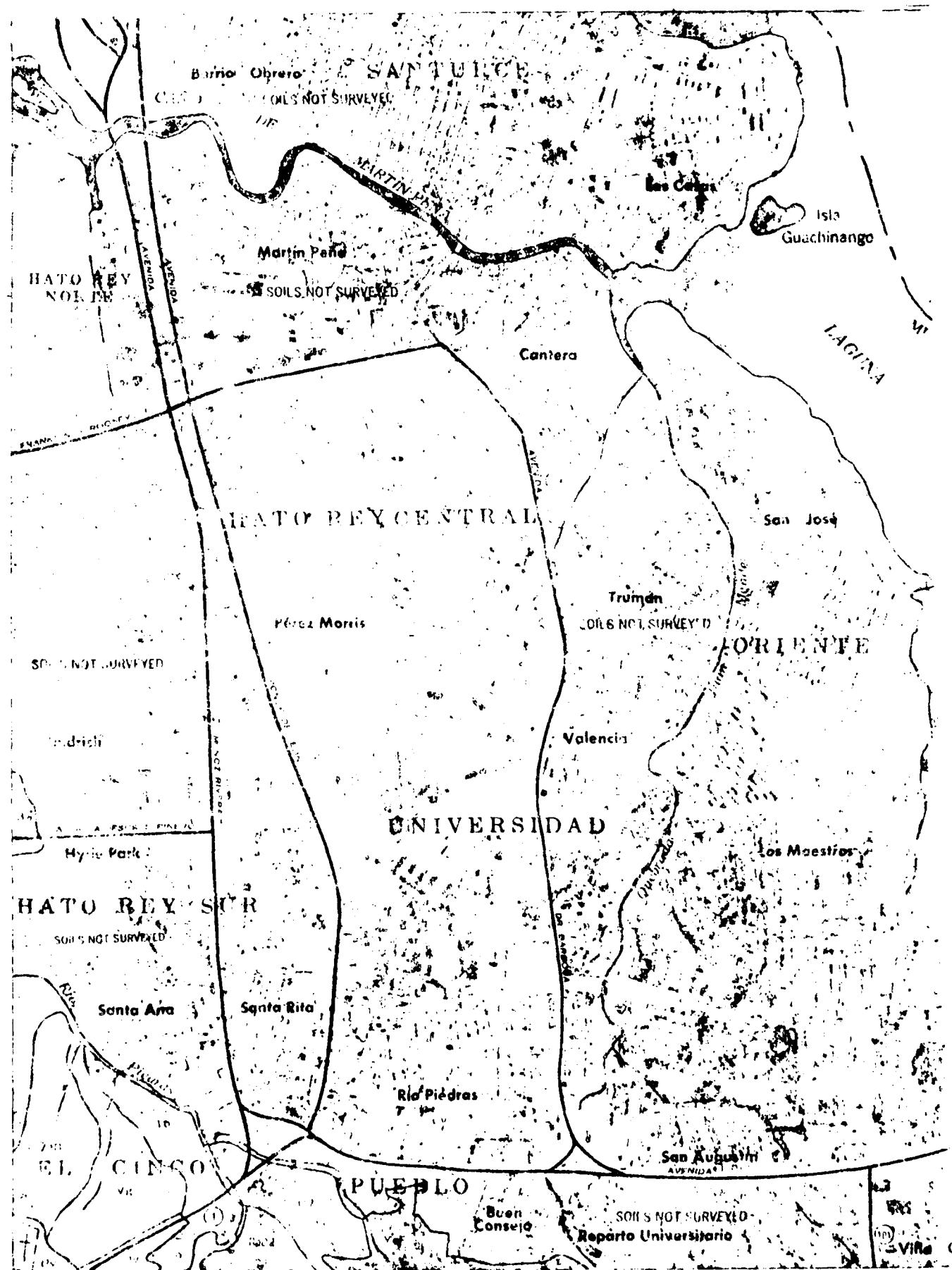


FIGURE 2. Continued.



FIGURE 2. Continued.

Drainage is one of the major characteristics influencing human settlement and therefore it can generally be used as a predictive factor in determining site location. In this instance the distribution of poorly drained soils can be used as a fairly good predictor of the absence of prehistoric sites, as will be noted later in the text.

TABLE 1

Typical Toa Series Profile

Ap	0 to 8 inches, dark brown (10YR 3/3) silty clay loam; moderate medium granular structure; slightly hard, friable, nonsticky, slightly plastic; many roots; slightly acid; clear smooth boundary.
B	8 to 16 inches, dark brown (10YR 3/3) silty clay loam; few fine faint pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many roots; slightly acid; gradual smooth boundary.
Cl.	16 to 56 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when crushed; many fine distinct dark reddish brown (5YR 3/4) and few fine faint light gray mottles; weak medium and coarse subangular blocky structure; ped surfaces and root channels have a grayish brown (2.5YR 5/2) coating at lower depths; slightly hard, friable, slightly sticky, slightly plastic; common roots; common black concretions; thin lenses of sand; slightly acid; gradual smooth boundary.
C2	56 to 60 inches, dark brown (7.5YR 4/4) silty clay loam; many fine distinct gray and brown mottles; massive; friable, nonsticky, slightly plastic; common fine sand grains; slightly acid.

The mollic epipedon is 12 to 20 inches thick. Reaction throughout is slightly acid to neutral.

The A horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

The B horizon has hue of 10YR, value of 3, and chroma of 2 or 3.

TABLE 2

Typical Vega Baja Series Profile

- Ap 0 to 7 inches, dark brown (10YR 4/3) silty clay; weak fine granular structure; firm, slightly sticky, slightly plastic; few fine black concretions; many fine roots; very strongly acid; gradual wavy boundary.
- A12 7 to 12 inches, mixed dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/8) silty clay; weak coarse sub-angular blocky structure; firm, sticky, plastic; few fine black concretions; many fine roots; strongly acid; abrupt wavy boundary.
- B21t 12 to 17 inches, dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/8) silty clay; weak coarse sub-angular blocky structure; firm, slightly sticky, slightly plastic; few fine black concretions; black coatings on ped faces and in root channels; few fine roots; very strongly acid; abrupt wavy boundary.
- B22t 17 to 32 inches, mixed strong brown (7.5YR 5/8) and gray (5Y 6/1); weak medium subangular blocky structure; firm, slightly sticky, plastic; seams between peds and root channels filled with gray clay; few fine black concretions; very strongly acid; gradual wavy boundary.
- B3 32 to 50 inches, brownish yellow (10YR 6/8) and gray (N 7/0) silty clay loam with pockets of yellowish brown (10YR 5/4) clay loam; weak coarse subangular blocky structure; firm, slightly sticky, slightly plastic; few peds and fracture planes coated with black; root channels and worm burrows filled with gray clay; strongly acid; abrupt wavy boundary.
- C1 50 to 55 inches, light gray (N 7/0) silty clay; many fine distinct strong brown (7.5YR 5/8) mottles; massive firm, sticky, plastic; medium acid; abrupt wavy boundary.
- C2 55 to 60 inches, light gray (N 7/0) and strong brown (7.5YR 5/8) silty clay; massive; firm, sticky, plastic; medium acid.

The solum is 30 to 60 inches thick. Reaction throughout is medium acid to very strongly acid, and acidity decreases with depth.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 or 4.

The B2t horizon has matrix colors in hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 8.

Vegetation and Fauna

Vegetation is another major environmental factor to be considered in relation to prehistoric site distribution. The character of the vegetation can be used as an index of biotic potential and can serve as a general indicator of the importance of a particular area in the subsistence activities of its prehistoric inhabitants.

The principal associations of the north coast of Puerto Rico as reconstructed by Gleason and Cook (1926) are shown in Figure 5. Two of these associations are much in evidence in the immediate vicinity of the project area; the mesophytic forests of the limestone hills and the mangrove forests which abound along the northern segment of the Puerto Nuevo and the southern margins of San Juan Bay. Both of these are significant habitats for faunal elements which played a major role in prehistoric subsistence. Land snails abounded aplenty in the mesophytic forests and as Pantel (1979) has demonstrated, these snails were a significant element of the diet of some aboriginal groups, since it takes only eleven snails to provide one pound of edible meat. The Mangroves on the other hand could be harvested for their rich crustacean and molluscan fauna.

Description of the Rio Puerto Nuevo Basin

The project area includes a significant portion of the Rio Puerto Nuevo, also known as the Rio Piedras drainage basin. Originating in the uplands south of San Juan, various creeks (quebradas) join to form the Rio Piedras. At the confluence of the Quebrada Margarita, the watercourse becomes the Rio Puerto Nuevo. The present day course of the Rio Puerto Nuevo, which the survey party traversed and which is within the project, is an artificial channel constructed in the mid-1950's. The original channel and outlet of the river are some 1 1/2 kilometers to the west. As shown on early maps,

the original flood basin consisted of extensive mangrove forest. The present outlet into San Juan Bay also passes through mangrove forest which lines both sides of the river until the confluence of the Puerto Nuevo with the Martin Pena Canal where the right bank becomes recent fill for a highway. Mangrove continues on the left bank up to the confluence of Quebrada Margarita. From that point to the confluence of Quebrada Josephina, the banks of the Rio Piedras are modern fill resulting from moderate to heavy urbanization.

Throughout the middle stretch of the river a meandering regime was occurring until channelization. Meander scars were, however, not visible due to heavy urbanization.

A large overgrown field behind the Agricultural Experiment Station was one of the few nonurbanized areas encountered during the reconnaissance. Relatively flat, the field was covered with tall grasses reaching almost 2 meters in height. The ground surface was obscured by a vegetative mat approximately 0.3 meter thick. Numerous isolated stands as well as linear stands of bamboo were encountered in the field. Water level of the river was near 2 meters below the top of the bank.

After passing under the PR Highway 1 bridge, the river becomes naturally entrenched and within 0.5 kilometer loses its named identity as a river. The Quebrada Guaracanal enters the Montes de Hatillo and the Quebrada Juan Mendez heads north toward the Laguna San Jose. Below the bridge elevations range from sea level to 10 meters, above from 10 meters to 120 meters.

PREHISTORIC BACKGROUND

The immediate lowland environment surrounding the Rio Puerto Nuevo and Rio Piedras, as well as the original Quebrada Margarita, seems to have been an area of limited aboriginal activity. There are no known or reported prehistoric sites in the project area and the protohistoric occupation seems to have been concentrated in lowland areas somewhat to the west, in the valley now occupied by Fort Buchanan. The accompanying section of the

founding and development of the first settlement in Puerto Rico, the town of Caparra, founded by Ponce de Leon in 1508, provides a fairly complete account of early historic developments in the immediate vicinity of the project area.

The only systematic survey work which has been performed near the project area is the work of Carbone and Nielsen (1976) at Fort Buchanan and the subsequent follow-up work by Pantel (1979). Although this is a limited literature to draw upon, the results of this work, combined with some observations on the character of the environment, can be used to make some general statements about the presence or absence of aboriginal cultural remains in the project area. The Fort Buchanan model indicates that in these highly developed areas of the north coast, the only places one is likely to find undisturbed aboriginal remains are in areas subjected to minimal impact during historic times and those areas which have difficult access. In Fort Buchanan prehistoric sites were located only in the rockshelters, crevasses and caves dotting the Tertiary limestone formations which form the northern and southern boundaries of the military reservation. Spot finds of cultural material were reported for the lowlands, but these generally were surface finds without any other association. It is very difficult to decipher exactly what the contact situation was like, but one assumes that besides the advantages offered by the protected inland location of the site, the area must have had other attractions for the conquering Spanish in terms of its ability to provide Indian labor for colonial endeavors. At any rate, there are a number of environmental factors which would make the Fort Buchanan area more attractive to prehistoric cultivators than the area immediately to the east which comprises the Puerto Nuevo-Rio Piedras environs. The soils in Buchanan are part of the Vega Alta series and are generally more friable and probably easier to cultivate. Manioc cultivation is generally more at home in the more friable soils in an undulating landscape such as that at Fort Buchanan. The soils are also richer because of the contribution from the limestones, whereas the Toa soils in the project area which do have the potential and good drainage characteristics are probably totally derived from volcanics and thus have somewhat different chemical and mineralogical characteristics.

At any rate, Anderson Cordova (1979) (cf. Appendix E) has indicated that there must have been considerable occupation in the lowland valley which is now Fort Buchanan and most of these remains are either totally destroyed or some fragments remain incorporated into the golf course landscape. Carbone and Nielsen (1976) found two major sites at Fort Buchanan, a cluster of rockshelters in the limestone ridge fringing the southern boundary of the fort and a cave site and associated apron of subsistence debris in the Montes de Caneja which form the northern boundary of the fort. These sites were later intensively evaluated by Pantel (1979) and were recommended for nomination to the National Register of Historic Places. The sites are late ceramic period sites and in addition to including large amounts of refuse in the form of land and marine gastropods and pelecypods, crab remains, mammal and bird bones, and ceramic fragments, there were indications of a possible human burial in the fissure cave of the Canejas site. The location of these sites, in what are patently very marginal positions, is a feature which as yet remains unexplained. It is known that throughout Puerto Rican prehistory, caves and rockshelters played a significant role not only as habitation sites but also as burial places and possible ceremonial centers as indicated by the abundance of petroglyphs and pictographs. However, in the case of the Canejas site which is located atop what must be at least a 40-degree incline, the presence of the large amounts of food refuse suggests a use not compatible with late prehistoric activities. A suggestion which has been made by Carbone and Nielsen to explain the seemingly marginal location of these sites is that they represent habitations of groups driven into these marginal positions by the activities of the Spanish during the repartimiento. This explanation must remain somewhat speculative because the sites are undated and no historic material was found at the Caneja site although the southwest site cluster did yield fragments of Spanish ceramic wares.

In conclusion, if one uses the Fort Buchanan survey results as a model for both site location and site prediction, it becomes apparent that the project area is one of low potential for prehistoric cultural resources.

HISTORIC BACKGROUND

Present day land use in the Rio Piedras basin is primarily urban residential (Table 3) primarily due to its position within the limits of the San Juan metropolitan area.

TABLE 3
Dominant Land Use in Acres, 1971-72

<u>Land Use</u>	<u>Acres</u>
Agriculture	853
Forest	2,724
Water	157
Wetland	322
Non-Productive	0
Residential	10,671
Urban	10,125
Rural	546
Outdoor Recreation	205
Public Facilities	1,399
Commercial	1,008
Industrial	499
Extractive	0
Communications	44
Transportation	465
TOTAL	18,347

(U.S. Army Corps of Engineers 1978:11)

The Puerto Nuevo and Rio Piedras areas have experienced a dramatic increase in population and urbanization during the last 30 years. The hydrology and topography of the region have been considerably altered by the channelization and diversion of rivers, the construction of a network of roads and expressways, the filling up of marshland and other lowlying areas for industrial development, waste disposal and construction purposes, etc. This development has resulted in the present day land use summarized in Table 3. Massive change through time was seen from the 1936 map (Figure 3) by the field party. Change between original Spanish settlement to 1936 was of obvious magnitude.

One difficulty in studying the local history of Puerto Nuevo is that it has never been a separate municipality. During the initial conquest and colonization of the island, the area now known as Puerto Nuevo and Puerto Nuevo Bay was under the jurisdiction of the town of Caparra. This, the first town on the island (1508-1520), is also the name given the residence of Ponce de Leon, the military governor of the island. The ruins of this building are partially preserved near the south gate of Fort Buchanan. A detailed history of this settlement is attached as Appendix E.

Two paths from Caparra to the Puerto Nuevo Bay were cut through the swamp-land which characterized large sections of this area during the sixteenth century.

In 1520, Puerto Nuevo came under the jurisdiction of San Juan when the capital was transferred there. During the remainder of the sixteenth and seventeenth centuries it continued to be a rural outpost of the capital.

The town of Rio Piedras was chartered in 1714 (Mayoral Barnes n.d.) and it is possible that Puerto Nuevo came under its jurisdiction. The area continued as a rural outpost serving as a source of food to the capital. In 1789, the town of Rio Piedras consisted of three houses constructed of rubble, and a rural population of 1,369 persons who cultivated cotton, sugar cane, coffee, manioc, fruit, plantains, and pineapples and bred cattle (Mayoral Barnes n.d.).

During the Nineteenth Century, with the liberalization of Spanish mercantile laws, the opening of ports to foreign vessels and economic incentives for growing crops such as sugar cane, coffee, and tobacco, Rio Piedras began to increase in size. In 1812, the road to Caguas was started and by 1828 there were 100 houses and 410 bohios in town (Mayoral Barnes n.d.). There was a first order road to San Juan (11 kilometers) and Caguas (24 kilometers), a second order road to Carolina, and a neighborhood path to Trujillo Alto

(7 kilometers). By 1877, the municipality of Rio Piedras included 13 barrios, a considerable increase over the four it had in 1828 (Mayoral Barnes n.d.).

During the twentieth century, urban development has been very rapid with Rio Piedras, Hato Rey, Puerto Nuevo, Santurce and San Juan becoming one continuous urban center. In 1951, San Juan annexed Rio Piedras beginning a process which has resulted in this town and the others mentioned above being incorporated within San Juan.

Specific information concerning the historic time period cultural resources of the Puerto Nuevo project area must be gleaned from a perusal of early historical sources. These sources often do not specify the localities in which events occurred. Archival sources are organized by municipalities and, as discussed earlier, do not include a separate heading for Puerto Nuevo. This requires that information pertaining to all of San Juan and Rio Piedras be checked. For the purposes of this reconnaissance, only small portions of the wealth of Nineteenth Century archival sources were checked. The results of this review are discussed below.

Fondo de Obras Publicas: Serie Carreteras y Puentes

These documents deal with stages of construction and repair of Highway 1 from Rio Piedras to Caguas. Specific reference to the Rio Piedras bridge can be found in Fondo Obras Publicas, Serie Carreteras, Carreteria Numero 1, Rio Piedras-Caguas, Leg. #15, 1840.

Fondo Departamento de Hacienda: Serie Tasacion

This repository contains aerial photography of Puerto Rico taken for land appraisals. They are organized in alphabetical order by town and some exist for San Juan in box 15.

Other information concerning the Rio Piedras area was acquired through personal communications. To gain information on the history of a Spanish



FIGURE 3. 1936 Soil Survey.

structure with an octagonal brick chimney located in the old Rio Piedras water filtration plant, Don Arturo Roque, former director of the station and still acting as consultant to the nearby UPR Botanical Gardens Office, although unable to shed light on this structure, led us to the Aqueducts and Sewers Authority. Here, Engineer Antonio Rodriguez Bianchi informed us that the structure was built as the original "power plant" for the Rio Piedras filtration plant around 1898. Rodriguez was in the process of writing a report on the filtration plant which should offer additional details.

Roque was useful in providing information on the lands surrounding the present Agricultural Experiment Station downstream from the plant. A cursory review of topographic maps had suggested this area from the filtration plant down to the Experiment Station to potentially be old fields. The tracts surrounding the Station were, as was true throughout most of the island in the early twentieth century, under sugar cane cultivation. Several tracts were donated to the Station in 1910 by the Sugar Cane Grower's Association (Asociacion de Productos de Azucar). Other lands were acquired during the 1940's and 1950's.

One of the few relatively undeveloped parcels within the project is presently on Experiment Station lands. A partial title search revealed little in the way of historic time period improvements in this large overgrown field described below. The only feature revealed in this search is the Caguas Railway Company tracts (Appendix F) passing through the field. The remains of the railroad bed are still evident as a long linear stand of bamboo. No central or other structure during the Twentieth Century existed here. The entire title search is reproduced as Appendix F. Information should exist on land use of the area for earlier times, but could not be located.

FIELDWORK AND RESULTS

As has been indicated previously on the basis of a preliminary evaluation of maps and aerial photographs, a number of decisions were made regarding site potential and survey priorities. Three areas were targeted for on-site

assessment: (1) The northern sector of the project area which included the diverted Rio Puerto Nuevo and the fringing mangroves; (2) the middle sector, specifically the area of the proposed Las Americas Park, which extends north and south of the banks of the Rio Piedras; and (3) the lands comprising the Agricultural Experiment Station and the Botanical Gardens. The northern sector was dismissed from further consideration after a boatrider down the Puerto Nuevo as far as Franklin D. Roosevelt Avenue confirmed many of our assumptions about the recent nature of the land fill and the manmade character of the landscape. Further terrestrial survey was deemed unnecessary in this stretch for two reasons; the landward sides of the mangrove forest were not high potential areas as originally anticipated, but rather, were currently operating landfills reaching 12 meters above the original surface. This was confirmed by boring logs from cores taken in these areas (Despiau 1976). Secondly, river bank profiles between Quebrada Margarita and Roosevelt Avenue were either modern fill or concrete bulkheads created for and by the intensive urbanization. In one case observed, the modern fill extended down to the present water level. The preponderance of filling operations along this river were made obvious at what, on the topographic maps, appeared to be a high terrace. It, too, was constructed of modern fill. Moreover, during our brief stay at this locality, a dump truck added more overburden.

In the middle sector a good picture of the nature of the soils and potential for cultural resources were provided by the ongoing construction activities associated with the development of the Las Americas Park. Most of the area south of Rio Piedras was totally disturbed by grading and landscaping activities and a number of deep profiles were exposed by pipeline trenches. No cultural material was found anywhere on this site and the heavy nature of these clayey Bajura soils (Table 4) was confirmed. The area north of the Rio Piedras was not surveyed. This area contains a small tongue of a soil unit mapped as part of the Toa series. If any channelization work is contemplated for this segment of the project area, this area should be subject to shovel test pitting to determine the presence or absence of cultural materials.

TABLE 4

Typical Bajura Series Profile

Ap	0 to 5 inches, dark brown (10YR 3/3) clay; weak medium subangular blocky structure; firm, slightly sticky, plastic; few fine roots; few dead roots; few krotovinas; few root channels; few fine pebbles; medium acid; gradual smooth boundary.
B	5 to 12 inches, dark gray (10YR 4/1) clay; mottles are common medium distinct yellowish brown (10YR 5/6), few medium distinct very dark gray (5Y 3/1), and few fine brown to dark brown (7.5YR 4/4); weak coarse subangular blocky structure; firm, slightly sticky, plastic; few pressure faces; few fine roots; few dead roots; few fine pebbles; medium acid; gradual smooth boundary.
C1g	12 to 31 inches, gray to light gray (5YR 6/1) and yellowish brown (10YR 5/6) clay; few fine greenish gray (5G 6/1) mottles; weak coarse subangular blocky structure; firm, sticky, plastic; few pebbles; few dead roots; slightly acid; gradual smooth boundary.
C2g	31 to 38 inches, greenish gray (5G 6/1) clay; many medium distinct brownish yellow (10YR 6/6) and few medium distinct bluish gray (5B 5/1) mottles; weak coarse subangular blocky structure; firm, sticky, plastic; neutral; gradual smooth boundary.
C3g	38 to 60 inches, greenish gray (5GY 6/1) clay; with common medium prominent bluish gray (5B 5/1) and common medium distinct olive brown (2.5Y 4/4) mottles; massive; firm, very sticky, very plastic; few dead roots; few soft black concretions; neutral.

The solum is 12 to 20 inches thick. Reaction is medium acid to slightly acid.

The A horizon has hue of 10YR and 2.5Y, value of 2 or 3, and chroma of 3 or less. It has moderate medium subangular blocky structure.

In the southern sector, which is comprised mainly of the bottoms which are part of the Agricultural Experiment Station, the field was walked from the

station building parking lot to the river's edge. However the nature of the ground cover was such that there was absolutely no surface visibility. An attempt was made to evaluate the profile at the river bank but the luxuriant vegetation which seems to have been made doubly thick by the unusually heavy precipitation this year rendered this impossible. This bottomland at the Agricultural Station comprises the remainder of the project area which is mantled with Toa soils and should be incorporated in any future intensive survey efforts if any impacts are projected for the area.

RECOMMENDATIONS

Recommendations for a Cultural Resources Survey: No significant cultural resources were located in the project area during this reconnaissance. This negative information does not present a clear picture of the project's potential for the location of cultural resources, however, as has been discussed above.

Archeology

Based on information derived from our field observation, soils and other sensitive archeological predictors, our recommendations for a cultural resources survey for the Puerto Nuevo project includes only those areas of, and contiguous to, Toa soils. Contiguous areas should be considered since recent Late Period research (Gary Vesciulus, personal communication to Carbone) has indicated site placement on the fringes of, rather than directly on, friable soils. Presumably, these groups choose not to expend valuable agriculturally productive soils for community layout.

Two such areas are denoted on Figure 4, just upstream from the Hiram Bithorn Stadium and the large field behind the University of Puerto Rico Agricultural Experiment Station. The fringes of this soil unit may also be of high probability for locating early haciendas since several were sited on Late Period aboriginal sites.

Historic Archive Search

Due to the limited time available for this reconnaissance, only a small amount of information could be developed for historic time period land use. Additional information pertaining to the early history of the area can be gathered from a search through documents in such volumes as the Boletin Historico de Puerto Rico, the Cebulacio Puertoriquento, Documentos de la Real Hacienda, etc.

For the nineteenth and twentieth centuries, the General Archives repositories could be checked. Public property records should have information concerning the history of land use. Road and bridge records should provide data concerning the development and expansion of the road network of metropolitan San Juan. Information on train routes is also available.

Important information on recent urban development in the area can be obtained from maps. The General Archives in San Juan, the Puerto Rican Highway Authority, the Public Works Department, the Planning Board, the USGS, the U.S. Army Corps of Engineers, the UPR Puerto Rican collection, the Aqueduct and Sewers Authority, the Department of Natural Resources and the Treasury Department are sources of such maps.

Property Register records of Rio Piedras and San Juan contain data on land titles, sales and appraisals. These documents usually provide descriptions of municipal land and inventories of structures.

Sources suggested above should provide enough data to clarify the history of land use and development in the project area.

We are unable to resolve the issue of pre-1800 development since most of these records appear to be in Spain.

Standing structures

The degree of documentation presented in Appendix C for buildings is sufficient and no further work is recommended.

Only one of the bridges inventoried on this project warrants any further work. The remainder are of recent origin and provide no new knowledge to the engineering record. The only bridge to be threatened by Corps activities is bridge number two.

Consultation with the State Historic Preservation Officer should be undertaken to decide upon appropriate measures for mitigation, such as avoidance, relocation or adequate recording.

The dam associated with the Rio Piedras Water Filtration plant, constructed as a part of the power plant mentioned above, may be eligible for the National Register of Historic Places as a part of the National Architectural and Engineering Record. If the project is to impact this structure, additional coordination with the State Historic Preservation Officer, the National Register of Historic Places and the Advisory Council on Historic Preservation will be required.

Additional Recommendations

Although not requiring survey due to its position outside the impact zone, the old "power plant" structure of the waterworks should be carefully avoided during construction. It should be considered as eligible for inclusion in the National Register of Historic Places.

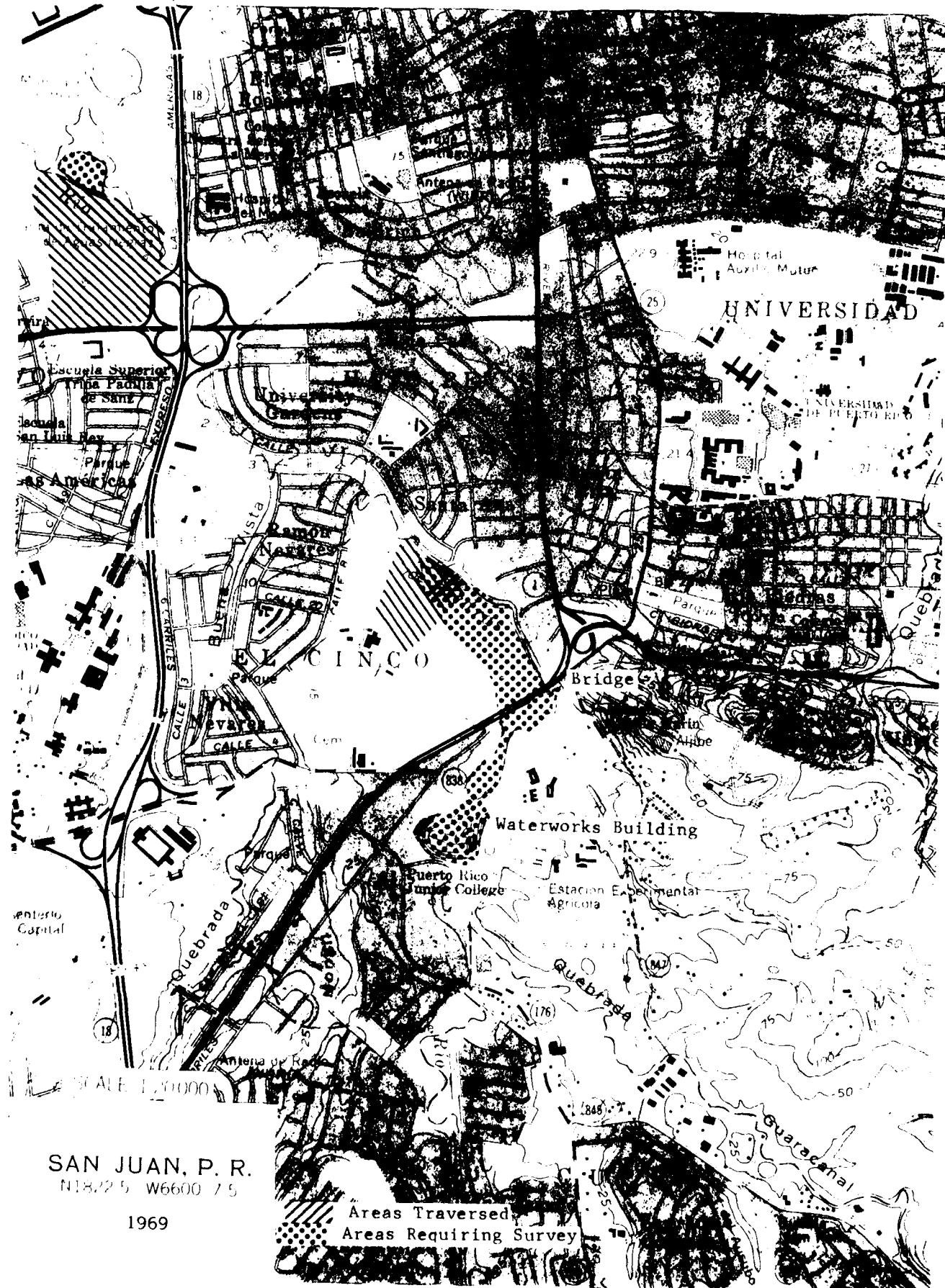


FIGURE 4. Areas Recommended for Survey.

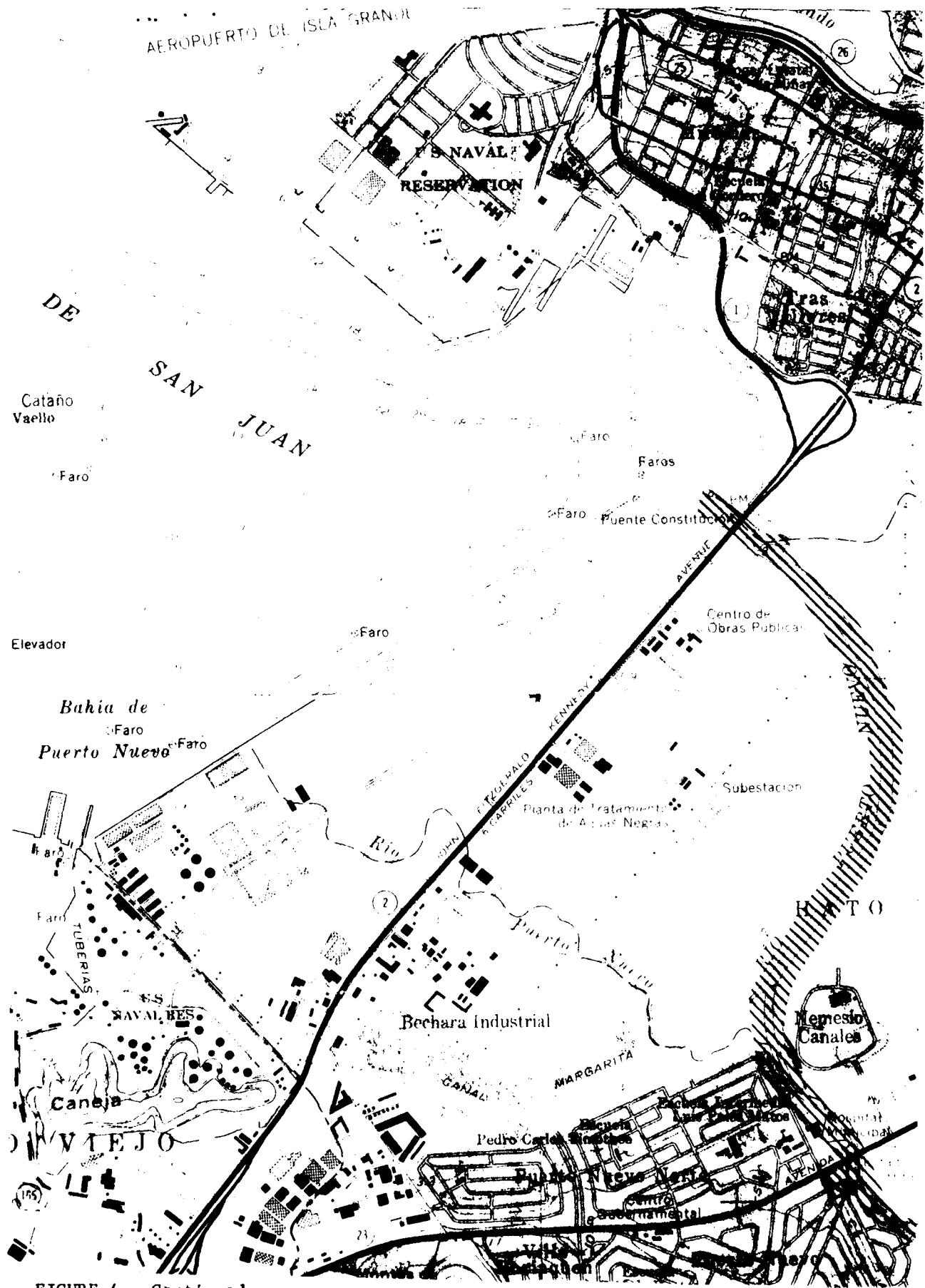


FIGURE 4. Continued.

RIO GRANDE DE LOIZA

ENVIRONMENT

Certain major aspects of the environment of the north coastal plain have already been described in the section on the Rio Puerto Nuevo. Because the Rio Grande de Loiza is the largest river on the island, draining a large part of eastern Puerto Rico from its headwaters at the Sierra de Cayey to its mouth on the north coast at the town of Loiza (Figure 5), it is very difficult to generalize the environmental setting. For the purposes of this report only certain segments of the drainage basin will be considered in detail, especially as environmental factors are considered to affect site settlement and distribution.

Geology

The Rio Grande de Loiza and its tributaries the Rio Gurabo and Rio Valenciano which were included as part of this preliminary reconnaissance cut through all major geologic segments in eastern Puerto Rico. Their headwaters begin the Sierra de Cayey. The main river then winds its way through the Caguas alluvial valley and cutting through massive andesitic tuffs and shales as well as sedimentaries and intrusives. Finally, in its lower reaches the river flows across the northern coastal plain winding around some tertiary limestone remnants before it empties out over the playa lands into the Atlantic Ocean. Because the survey focused on the lower reaches, with only minimal attention paid to the intermediate and upper segments, the former will be dealt with in more detail. In the upper reaches the rivers are deeply incised into the bedrock and the gorge-like settings provide an ideal opportunity for the location of rockshelters.

The lower reaches are here defined as the segment from the Carraizo dam above Trujillo Alto to the river's mouth in Loiza. The landscape in this

segment consists basically of remnants of the old Tertiary coastal plain surrounded by the more recent Quaternary alluvial deposits. Lobeck (1922) describes these segments as follows:

East of San Juan the remnants of the coastal plain are small and infrequent. There is a group of hills just east of the highway between San Juan and Rio Piedras, and eastwest trending row of hills northeast of Carolina, entirely surrounded by alluvial deposits. These are conspicuous features in an otherwise monotonous landscape, and their altitude, although inconsiderable, suggests that the coastal plain formerly extended much further south over the flat rolling country between Carolina and Rio Grande. Whether a greater amount of material has been stripped from the oldland in this eastern end of the coastal plain than in the western part it is impossible to ascertain; but it does not seem unlikely, inasmuch as there is a greater precipitation in the east.

As with the tertiary remnants in the Puerto Nuevo-Fort Buchanan area, the ones around the Carolina area as well as the remaining smaller units just south of the town of Loiza provided a major locus for prehistoric habitation. The alluvial lands and playa lands comprising the recent coastal plain and floodplain were also good candidates for high density prehistoric as well as historic occupation. An interesting aspect of this lower portion of the Rio Grande is the extensive sequence of beach ridges which extend from Punta Vacia Talega to Punta Miquillo which the river cuts through.

Kaye (1959: 115) describes this feature as follows:

The coastal area both east and west of the Rio Grande de Loiza has deepest and most extensive series of fossil beach ridges and relict shorelines on Puerto Rico. These can best be appreciated on aerial photographs where it can be seen that they extend from Punta Miquillo on the east to beyond Punta Vacia Talega on the west. The band of fossil beaches from three interconnected lunate festoons, the western one of which was apparently anchored on one side by the formerly more extensive eolianite ridge of Punta Vacia Talega and on the other by lower miocene limestone knobs that are situated just southeast of the town of Loiza Aldea. The middle festoon was anchored by the latter knobs on one side, and on the other possibly by a reef that is now on the landward side of Punta Uvero. The easternmost festoon was controlled on the west by the reef of Punta Miquillo, which in turn probably rests on a knob of lower Miocene limestone.

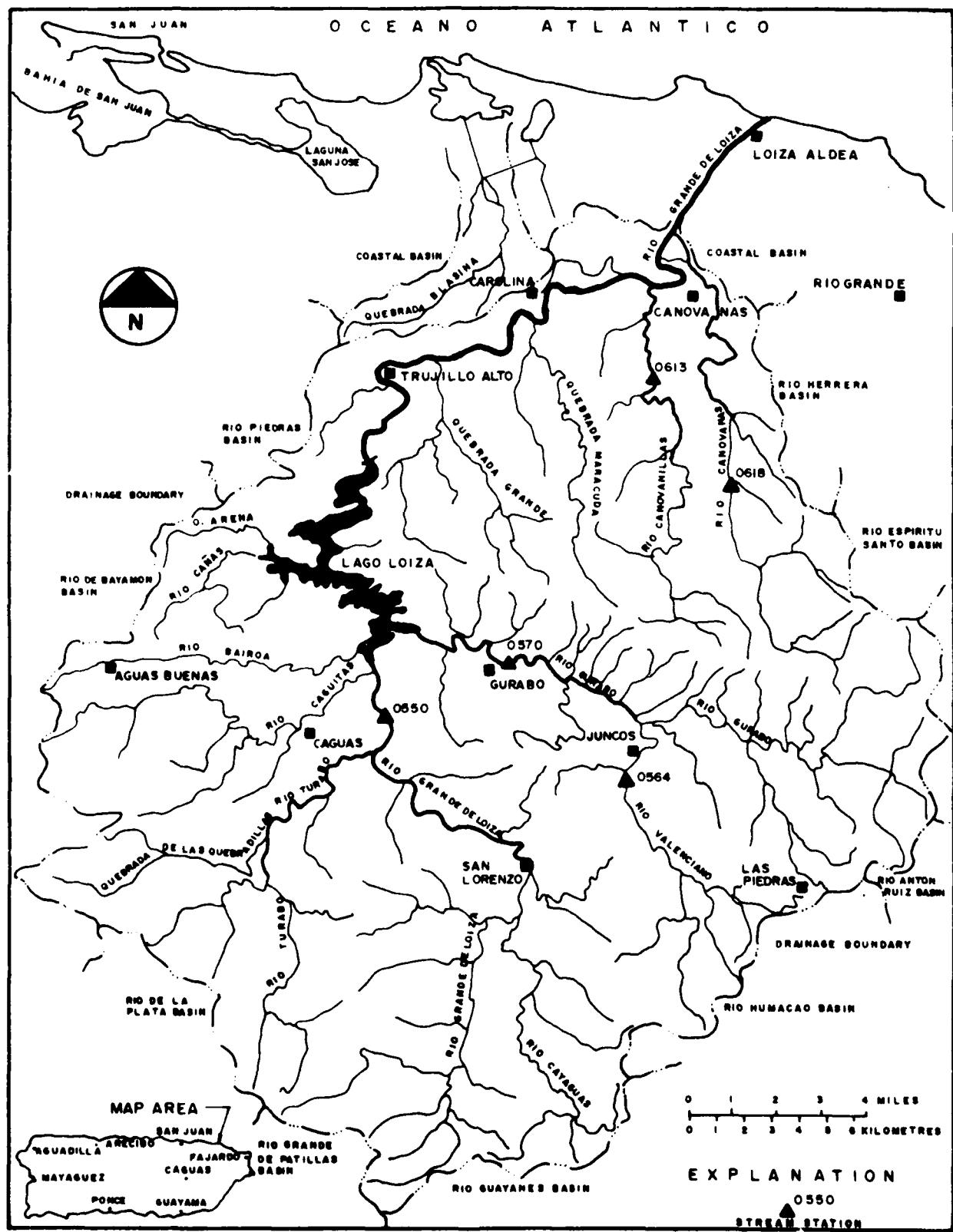


FIGURE 5. Rio Grande de Loiza Basin.

The topographic expression of these fossil beaches varies from well defined sandy beach ridges, attaining altitudes of 12 feet at a few places close to shore, to very low swales in the interior at altitudes of 3 feet or less. The latter ridges, or traces of ridges, are barely perceptible on the ground, though they show up well from the air. It is possible that they were formed at a sea level that was 1 to 2 fathoms (6-12) feet lower than the present datum. In fact, a slow shift from lower to present sea level is possible recorded by the transition from the featureless marsh on the south to beach ridges of increasing prominence and altitude to the north.

Soils and Hydrology

There are three major soil associations which mantle the project area (SCS, 1977) and these are related to both parent material and hydrological conditions. The first association, as shown in Figure 6 is that consisting of deep, very poorly drained soils which comprised most of swamps and marshes both to the east and west of the Rio Grande. The second association of significance is the Catano-Aquadilla association. This association is comprised of soils which have developed on the relict beach ridge deposits. The soils are deep, excessively drained nearly level to gently sloping. The third association is the Coloso-Toa-Bajura association which consists of deep, well drained to poorly drained, nearly level soils on floodplains.

Figure 7 is a more detailed mosaic of the specific soil series around the mouth of the Rio Grande. This figure shows a more or less even distribution between the clays, (Bajura and Fortuna) silty clays (Pinones) and silty clay loams (Coloso) of the ColosoToaBajura association and the loamy sands of the CatanoAquadilla association. It should be noted that former soils are all occasionally flooded, and because of their generally slow permeability they present limitations to farming in the absence of soil and water conservation practices. The Catano loamy sands on the other hand, although described in the Soil Conservation Service Soil Survey Manual as "not suited to cultivated crops because of its low available water capacity, rapid permeability, and low fertility" was probably of primary importance in prehistoric times. The survey manual does indicate that the soil is used for cassava cultivation. The 1942 survey manual (Richards, 1962) further states that

SOIL ASSOCIATIONS

SOILS OF THE HUMID AREAS

- 1** Swamps-Marshes association: Deep, very poorly drained soils on the coastal plains
- 2** Pandura-Rock land-Patillas association: Shallow to deep, well-drained, steep and very steep soils on plutonic uplands
- 3** Coloso-Toa-Bajura association: Deep, moderately well drained to poorly drained, nearly level soils on flood plains
- 4** Los Guineos-Humatas-Lirios association: Deep, well drained and moderately well drained, gently sloping to very steep, acid soils on volcanic uplands
- 5** Mabi-Rio Arriba-Cayagua association: Deep, somewhat poorly drained and moderately well drained, nearly level to moderately steep soils on foot slopes, side slopes, terraces, and alluvial fans
- 6** Caguabo-Mucara-Naranjito association: Shallow and moderately deep, well-drained, sloping to very steep soils on volcanic uplands
- 7** Los Guineos-Guayabota-Rock land association: Shallow to deep, well-drained to poorly drained, strongly sloping to very steep soils on volcanic uplands of the tropical rain forest
- 8** Catano-Aguadilla association: Deep, excessively drained, nearly level to gently sloping soils on coastal plains

SOILS OF THE DRY AREAS

- 9** Coamo-Guamani-Vives association: Deep, well-drained, nearly level to strongly sloping soils on terraces and alluvial fans
- 10** Descalabrado-Guayama association: Shallow, well-drained, strongly sloping to very steep soils on volcanic uplands
- 11** Jacana-Amelia-Fraternidad association: Moderately deep and deep, well drained and moderately well drained, nearly level to strongly sloping soils on terraces, alluvial fans, and foot slopes

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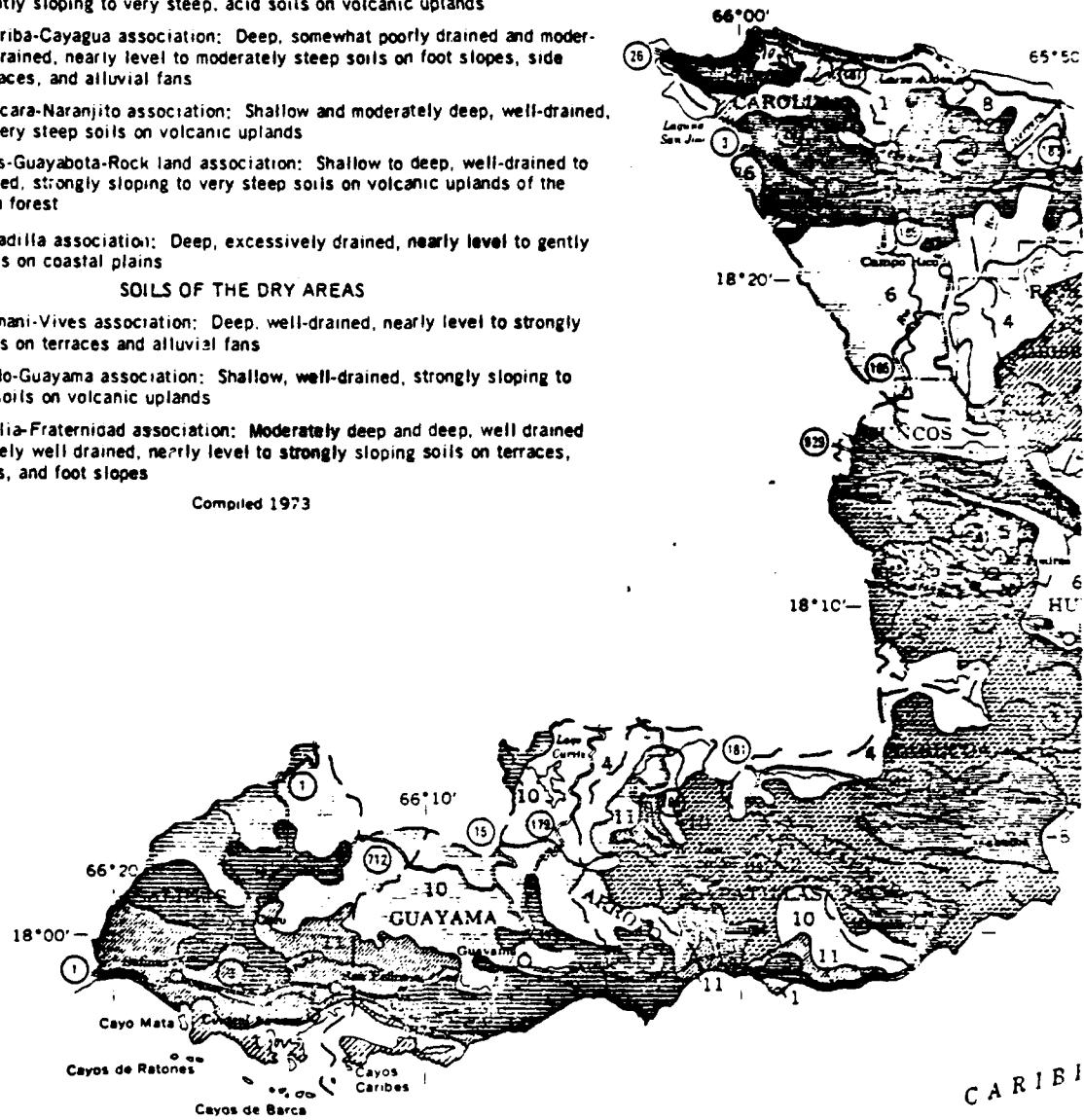


FIGURE 6. Soil Associations, Rio Grande de Loiza.

according to the 1935 Puerto Rico Reconstruction Administration census, of all the soils commonly used for cassava cultivation the Catano loamy sand provided the highest yields. This obviously is a factor of primary importance from the point of view of prehistoric settlement and subsistence.

Vegetation and Fauna

As has been previously stated, the Rio Grande de Loiza has the largest drainage basin of all the rivers in Puerto Rico. With its headwaters in the Cordillera Central the river traverses two of the major vegetational association groups which have been defined by Gleason and Cook for the island. In their classification Gleason and Cook distinguished three major vegetational groups which they correlated roughly with certain features of climate and soils:

- (1) the vegetation of the northern coastal plain, occupying a region of limestone or alluvial soils and characterized by a heavy rainfall;
- (2) the vegetation of the central mountain region occupying soils chiefly of volcanic origin and characterized also by heavy rainfall; and
- (3) the vegetation of the south shore, characterized by scanty rainfall with frequent droughts, but occupying soils of diverse nature and origin.

The climax in the area is basically a mesophytic forest and as you progress inland to the mountainous interior the mesophytic character of the forests increases ultimately reaching tropical rain forest conditions with variations among the different associations being controlled by factors such as exposure.

From both the faunal and vegetational point of view the northern coastal plain and adjoining interior areas provided one of the richest habitats primarily because of the high diversity encountered over such a small area.

The fauna of significance to prehistoric peoples was primarily that associated with the habitats on the coast such as the mangroves. On shore shallow and off shore deep water habitats which were within easy access were also of considerable importance in prehistoric times. Inland the mesophytic forests of the alluvial plain as well as those of the mountainous interior provided the ideal setting for the limited vertebrate and invertebrate fauna which was exploited by the prehistoric peoples of the area. These included several species of birds, the small rodent Hutia as well as a number of terrestrial gastropods.

PREHISTORIC BACKGROUND

The lower reach of the Rio Grande de Loiza is probably one of the most significant areas in the island's prehistory. Much of the initial contact between Spanish colonialists and the aboriginal population occurred in this area of northeastern Puerto Rico and the ethnohistoric record for this region is equally rich. Archeologically the area contains three of the most significant sites in the history of Puerto Rican archeology. At Cueva Maria la Cruz, located in a large domeshaped vault in the Tertiary limestone remnants southeast of the town of Loiza, Alegria was the first to confirm the existence of a preceramic peoples in the prehistory of Puerto Rico. Nearby at the site of Hacienda Grande Alegria also discovered evidence for the earliest ceramic occupation on the island, while upstream, just north of the town of Trujillo Alto Rouse excavated the Cuevas site which served as the type site for the Saladoid experience in Puerto Rico. These sites are not only important for their research value but are also highly significant for the role they played in the development of Puerto Rican archeology and the scientific study of prehistoric cultures. Thus they are eligible to the National Register of Historic Places not only for their scientific importance (Criterion D) but for their historical importance as well (Criteria A and C). All three of these sites have been discussed in detail in the section on the prehistoric background for the whole island (Appendix A) and therefore need not be discussed again. What should be kept in mind is that significant portions of these sites still remain unexcavated and these portions are crucial to a complete understanding of the prehistory of Puerto

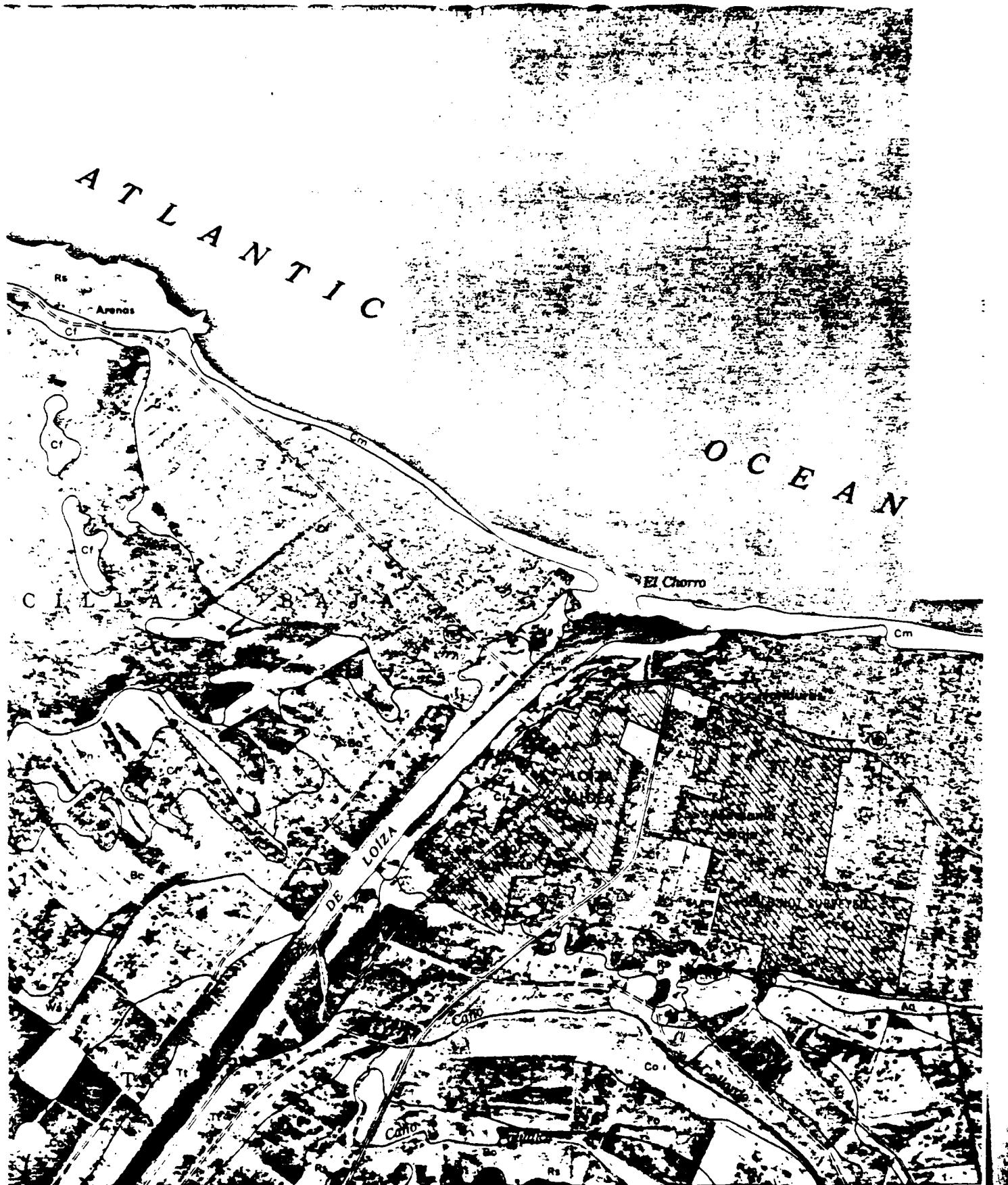


FIGURE 7. Soil Mosaic of the Loiza Aldea Area.

Rico. The Commonwealth of Puerto Rico through the State Historic Preservation Office (Office of Cultural Affairs) has recognized their importance and is taking evaluative measures to insure that the sites are officially listed on the National Register as soon as possible. Plans are also in the works for the acquisition of the land around Cueva Maria la Cruz for the development of the area into an educational and recreational facility.

The literature and archival search also turned up a considerable number of new sites in the immediate vicinity of the Rio Grande. Most of the information on these sites was obtained from Miguel Rodriguez who has a long standing interest in the prehistory of the area and who has been conducting formal and informal surveys of the region for a number of years.

One finding of potentially highly significant implications for the prehistory of the area is the suggestion by Kaye that the prehistoric inhabitants of this region may have been involved in large scale public works. Kaye has provided two examples which support his highly controversial contention. The first is the fact that the Rio Grande, in contrast to most of the north and east coast rivers which have a tendency to avoid sandy coastal stretches and to favor positions that hug close to the sides of rocky promontories does not have a protected river mouth. According to Kaye (1959:109):

This river exhibits several essential conditions for the formation of the protected mouth, even though it has not yet attained this stage of development or has lost a protected mouth in the rapid prograding of the deltaic shoreline about its mouth. The river mouth, particularly during prolonged dry periods when river flow is much reduced, is subject to damming by a heavy beach bar. This in turn, brings about widespread flooding of the coastal plain. Because of the economic seriousness of these floods the sand bar barrier must be dug out by hand labor whenever it builds up to the threatening height. In essence therefore, the river maintains the nonprotected position of its mouth only by the intervention of man. Without this it would establish a protected mouth at the side of Punta Vacia Talega to the west. That it had not done so at the time of the first colonization of Puerto Rico in the early 16th century suggests that the intervention by man in the maintenance of its outlet may date from early Indian times.

Another suggestion proffered by Kaye (1959:109) is that the Indians may also have been responsible for the shape of the river's course in its lower three miles.

...it is interesting to note that another aspect of the Rio Grande de Loiza may be the result of the engineering activity of the Indians. The river has a remarkably straight course for the last 3 miles—very unlike the meandering paths followed by all the other rivers of the north coast as they cross the marshy coastal plain. Moreover, abandoned channels show that today's straight course did not always exist. Is it possible, then, that the almost unnatural straightness of the river is the result of channel straightening and outlet maintenance by the aboriginal population? The question rightfully belongs to archeology...

Needless to say the implications of this for Puerto Rican archeology are overwhelming. As a case in point an attempt was made to trace the location of one of the old river channels in relation to the site of Hacienda Grande utilizing aerial photos as well as the soil survey manual. This reconstruction is shown in Figure 8. The location of the site thus seems ideally situated in close proximity to the old river yet at the edge of the most productive soils (Catano loamy sands) from the point of view of manioc cultivation. This is highly speculative but the hypothesis could be tested by a series of radiocarbon dates on the old channel deposits and oxbows.

Although this section has concentrated on the lower reaches of the Rio Grande de Loiza, it should be noted that the literature search yielded a considerable number of references to pictographs/petroglyphs in the middle and upper section of the Rio Grande as well as on major tributaries such as the Rio Gurabo and the Rio Valenciano.

The source for this information was Fewkes (1907) who based his discussion on a number of late 19th century pamphlets and manuscripts (e.g. Pinart, 1893, Krug, 1876; Dumont, 1876) as well as his own personal visit to several sites. The three rivers in this interior part of the island are flowing on bedrock and the beds are littered with a giant boulders which lend themselves to the display of pictographs/petroglyphs. A large number of them

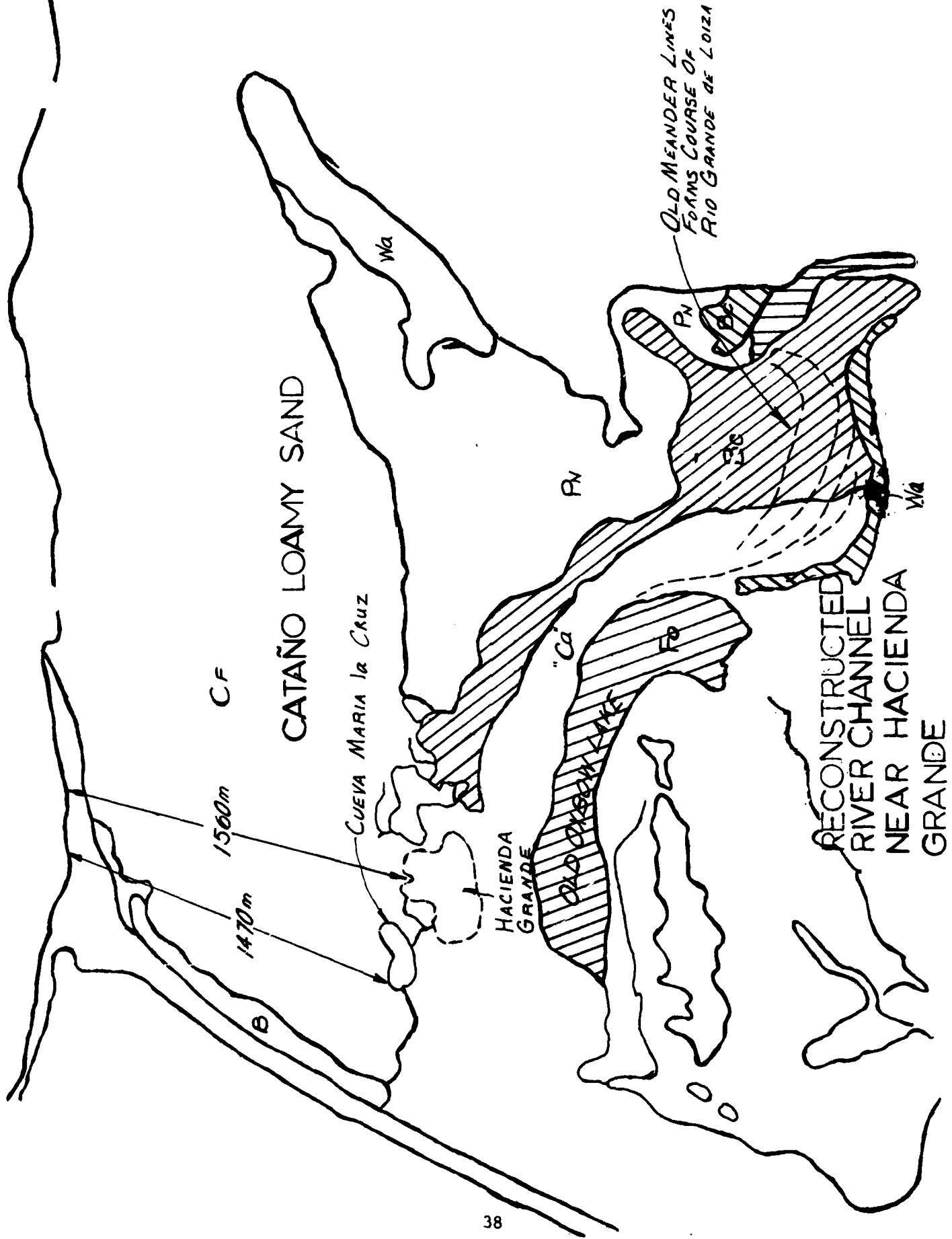


FIGURE 8.

have been reported in the literature and they also form the basis for local lore regarding the Indians. Referring to the manuscripts by Krug and Dumont, Fewkes gives the following account:

The pictographs which they describe, and of which Krug gives a full page plate, are said to be on a rock called Piedra de la Campana ("bell stone") set on two upright rocks in the middle of the Rio Grande de Loisa (sic), not far from the town of Gurabo.

A perusal of these publications induced the author to visit Gurabo, and, although he was not able to find these pictographs, he was rewarded by the sight of a boulder, also poised on two upright rocks, situated in the Loisa river halfway between Caguas and Gurabo. This stone, locally known as the Cabeza de los Indios ("head of the Indians"), was found to bear several rude incised figures which were too illegible to be identified. (Fewkes, 1907: 149).

In another section of the book (p. 154) Fewkes also makes reference to "several river pictographs" in the river, "a short distance from Juncos near the road from Humacao to the town." Fewkes does not specify which river but from the map one would have to assume that he is referring to the Rio Valenciano.

HISTORIC BACKGROUND

Local History

Since the Rio Grande de Loiza project area encompasses various municipalities, the first part of this section of the report will be divided into two sections: one dealing with the local history of the municipality of Loiza and another with the local history of Gurabo, Juncos, and San Lorenzo.

Loiza

The town of Loiza lies on the northern coastal plain of Puerto Rico, bounded on the west by Carolina, on the east by Rio Grande, and on the south by Canovanas. Loiza is located on the east bank of the Rio Grande de Loiza,

the largest river on the island. The municipality includes the barrios of Loiza Aldea, Mediania Alta, Mediania Baja, Torrecilla Alta, and Torrecilla Baja.

The history of this area begins with the period of Spanish conquest and initial settlement of the island. The Spanish encountered a considerable Indian population along the river banks and also close to the mouth of the Loiza River. The Indians were promptly utilized as labor.

The XVIth century also saw the beginning of cane cultivation. There is evidence that in 1589 there were 3 sugar ingenios (mills) and many haciendas along the banks of the Loiza River (BHPR 1914: 83, Memorias de Melgarejo). Melgarejo mentions that one of these three mills was located next to the mouth of the Loiza River, and that this was also the site of a fortress-house (casa fuerte).

This development and emphasis on cane cultivation created a need for labor. Since the Indian population was so quickly depleted, the Spanish began to bring black slaves into the Loiza area, which became an important cane producing region of Puerto Rico.

Despite the fact that Loiza was settled early in the colonial history of Puerto Rico, it did not become a town until 1719. Nevertheless, it was still one of the first 6 communities in the island to be officially instituted as a town. The town church was also built during this time (BHPR, 1921, Vol. VIII: 211). This church, San Patricio, remains on the town square and is on the National Register of Historic Places.

Information concerning the structures and layout of the town and surrounding areas is available from Fray Inigo Abbad y Lasierra's 1776 description of Loiza (1959:108). The town consisted of the Parish Church and 5 houses which formed the plaza, plus surrounding dwellings that totaled 166, with a population of 1,146. A one and one half league valley was located west of the town. Haciendas were established here, and plantains, palms, oranges, lemons, tamarinds, cassava (manioc), cotton, pineapple, hicacos, melons,

watermelons, beans, and sugar cane were grown. Abbad y Lasierra also mentions rice cultivated in the lagoons which form part of the Loiza area, as well as livestock and fishing, as other economic activities.

During the mid-1800's, Loiza began to decline in importance. The town only had two stone structures, the church and the Casa del Rey (Alegria, 1954). Most of the free black population lived in the coastal barrios of Loiza, the Medianias and Loiza Aldea, while the planters and their slaves were concentrated in the haciendas close to the town (La Gran Enciclopedia de P.R., 1976). There were many haciendas scattered in the rural area of the municipalities of Loiza, Carolina, and Canovanas during the late nineteenth century, and it should be possible to relocate these by studying old maps.

During the beginning of the XXth century, when Puerto Rico came under United States domination, most sugar mills and family-owned haciendas were displaced by the establishment of big "latifundios" and sugar centrales. This was a result of a deliberate U.S. policy to increase and mechanize sugar production in the island for purposes of export to the United States. Loiza continued to be an important sugar producing area during this period, and even today depends on sugar, other minor crops and coconuts as the main means of livelihood. Fishing also continues to be an important year-long activity.

Gurabo, Juncos, and San Lorenzo

The municipalities of Gurabo, Juncos, and San Lorenzo are located in the east-central mountainous region of Puerto Rico. The central part of Gurabo and the town of San Lorenzo are within the geographic region known as the Interior Caguas Valley, which is the largest interior valley in Puerto Rico with an areal extension of 32,483 acres. The northern section of Gurabo lies within the northern humid mountains region with elevations that reach 1,000 to 1,300 feet (Comprehensive Town Plan: Gurabo, p.1). San Lorenzo is south of Gurabo, and also has areas of high elevation towards its boundaries with the municipalities of Patillas (south) and Cayey and Caguas (La Gran Enciclopedia de P.R., 1976: 342).

Juncos, which is bounded to the south and west by San Lorenzo, lies partly within the geographic region of the Sierra de Cayey. All three towns are located within a high precipitation region and are at least partially drained by the Rio Grande de Loiza which has its origin in San Lorenzo's barrio Espino (La Gran Enciclopedia de P.R., 1976: 342).

Gurabo is drained to the west by the Rio Grande de Loiza and its affluents, the Gurabo and Turabo Rivers. The Valenciano river crosses Juncos in a north-south direction, and the Gurabo river crosses it in an east-west direction. The Rio Grande de Loiza passes north-southwardly through the municipality of San Lorenzo. Two other rivers drain San Lorenzo, the Cayaguas and the Emajaqua. The hydrology of these three municipalities is completed by a series of streams and creeks that criss-cross the area.

Despite the extent and fertility of the Caguas valley, which offered good potential for agriculture, livestock and lumbering, the area did not become settled until the end of the eighteenth and the beginning of the nineteenth century.

During the seventeenth century, Puerto Rico was basically a military bastion for Spain in the Caribbean, and there was no encouragement on the part of the Spanish crown to develop the economy of the island. Most of the population, which did not exceed 15,000 inhabitants (Comprehensive town plan-Gurabo) was concentrated in San Juan and in the four towns which had been settled at that time: Arecibo, Ponce, San German and Coamo. There was practically no commerce with Spain, and the settlers relied on subsistence agriculture and illicit trade to subsist. As a result of this, the few urban settlements were located primarily along or close to the coasts; most rural inhabitants like the ones that later formed part of towns such as Loiza and Fajardo, settled along the coasts as well. Towards the end of the XVIIth century there was only one small community in the Caguas valley, that of San Sebastian del Barrero, which later became the town of Caguas.

The eighteenth century saw a gradual change in Spanish absolutist policies, and the establishment of new ports in Spain for commerce with its colonial

possessions. Despite these policy changes, economic conditions continued to be poor, due to lack of capital, labor and a good communication system within the island (Comprehensive town plan: Gurabo). Nevertheless, the eighteenth century saw an increase in population, and, as a result, the establishment of many new settlements. A total of 31 new towns were founded, and a small but significant proportion of these were in the interior of the island (Comprehensive Town Plan: 8).

Juncos was founded in 1797. The land upon which it was established had originally formed part of a large tract of land known as the "Hato Grande de Los Delgados," which extended through the valleys formed by the Rio Grande de Loiza as it winds north of the Central Cordillera (La Gran Enciclopedia de P.R., 1976:167). During the XVIIth century, this hato (which refers to a plot of land used for pasture) was sub-divided into smaller hatos which became new settlement centers. The settlement of Juncos originated as part of the Hato del Valenciano, and became the center of the municipality of that name.

The town of San Lorenzo, founded in 1811, was part of the original Hato Grande de San Miguel. As a result, San Lorenzo's original name was San Miguel, then it was changed to San Lorenzo de Hato Grande, and now it is known as San Lorenzo.

Gurabo was founded in 1812. The territorial extent of these three municipalities fluctuated during the eighteenth century, with Juncos losing territory to both Gurabo and San Lorenzo when these were established (La Gran Enciclopedia de P.R., 1976: 168, 343).

Specific information concerning the structures and roads of these towns during the nineteenth century can be found in many widespread sources. Augusto Plee's sketches of some of the towns of Puerto Rico include a drawing of Gurabo (Alegria 1975: fig. 22:13) which shows a structure that appears to be the San Jose church and a few surrounding houses.

The 1853 topographic descriptions of Gurabo and Juncos also provide important information. According to these documents, the town of Gurabo had 3 establishments and ovens to make bricks and tiles (p. 141), a Parish Church constructed of rubble work and tiles, a new cemetery constructed in 1849, a Parish House and the Casa del Rey, both made of lumber and tile. It also had a stone and brick house still under construction, 36 wood and tile dwellings, 13 wood and straw (yagua) houses and 41 bohios. There was also a good road that went from Gurabo to Juncos, plus two rather rundown neighborhood roads, one leading to Caguas and the other to San Juan (141).

A bridge known as the Santiago bridge, built of pebble and brick, is also mentioned in this 1853 account. It was located over the stream that cuts through the town (141). Other small wooden bridges are also mentioned in the text (141).

The description for the town of Juncos provides similar information. As was the case with Gurabo, the church, cemetery, Casa del Rey and headquarters were the main public buildings. 32 wooden and brick tiled houses are mentioned, as well as 45 bohios.

All of these towns also had a central plaza, around which the church and municipal government buildings were located. This continues to be the case today.

During the first half of the nineteenth century, despite the relaxation of Spains mercantilist policies, the opening of commerce between the colonies and other countries, and the incentives for agricultural development, the towns of the interior of Puerto Rico continued to produce mainly for local consumption, rather than participate in the cultivation of specialized crops such as coffee and sugar (Comprehensive town plan: 9-10). This was largely due to the inadequate means of communication with the coastal areas that had direct access to the main island ports of San Juan, Ponce, and Mayaguez by means of the coastal railroad system (Com. town plan: 10). Nevertheless, the population of these municipalities continued to increase, and limited cane production was initiated in the flat areas of these towns.

During the first half of the twentieth century, the interior towns became absorbed into the specialized cane production that characterized most of the island. As was the case with the coastal areas (see above for discussion of Loiza), most of the municipalities' lands were converted into large sugar latifundi owned by American absentee-owners. Most small land owners lost their farms to the big sugar monopolies such as the Fajardo Eastern Sugar Associates. The following quote, taken from The Gurabo Comprehensive Town Plan, illustrates the extent of these monopolies (p. 13).

"Esta compania controla todas las centrales de Caguas a Humacao, y una gran parte de los terrenos caneros del Valle de Caguas, y de los valles costeros del noreste y este de la Isla, por ejemplo, Gurabo, Juncos, Las Piedras, Humacao, Naguabo, Fajardo, Luquillo y Loiza. En Gurabo, solamente, controla 1,834.5 cuerdas y junto con los otros municipios mencionados el total asciende a mas de 10,000 cuerdas." (Information taken from the 1935 census.)

"This company controls all the sugar mills from Caguas to Humacao, and a large part of the cane land of Caguas Valley as well as the coastal valleys in the northeast and east of the island, for example Gurabo, Juncos, Las Piedras, Humacao, Naguabo, Fajardo, Luquillo, and Loiza. In Gurabo, only, they control 1,834.5 cuerdas and together with other municipalities mentioned total more than 10,000 cuerdas." (Translation ours)

During the 1940's and 1950's, the Government of Puerto Rico began to foment the industrial development of the island, and agriculture rapidly lost importance. Many light industries were established throughout the island, but these gave way in the 1960's and 70's to the establishment of heavy industries. The population of the island continued to increase, and the valley of Caguas became increasingly urbanized. Gurabo, Juncos and San Lorenzo continue to produce a small amount of cane, however, economic activities have shifted to the milk industry. Juncos is the largest milk producing municipality in the Caguas valley area (La Gran Enciclopedia de P.R., 1976: 166). The growing of tobacco, and employment in small manufacturing industries are the other current economic activities in these towns.

Background and Literature Search

The literature search for the Loiza project area centered around the XIXth century documents stored in the General Archives of San Juan. A thorough examination of the Water series of the Public Works repository revealed important information concerning projects to open channels from the Loiza river to Pinones or Vacia Talega. This in turn yielded evidence concerning the names and location of many sugar haciendas in the Loiza valley. Many of the sources mentioned in the Puerto Nuevo and Sabana Grande discussions were also checked for Loiza. Unfortunately, information dealing specifically with Gurabo, Juncos, and San Lorenzo was not examined, but should be in future cultural resource surveys of these areas.

The following is a discussion of the Archival sources that were examined and a summary of the information provided:

I. Fondo Obras Publicas (Public Works Repository)

A. Serie Aguas - Subserie canalizaciones - (Water Series, Channelization Sub-series)

1. Legajo 245, caja 474.

File concerning the construction of a canal that would take water from Loiza to the Pinones Lagoon. It includes a map illustrating the two alternate canals from the Loiza River to Pinones. The map also shows the land division, and the haciendas of that time. August 5, 1877. Its scale is 1 - 20,000 meters, but it is in bad condition and could not be copied for purposes of this report.

The following Haciendas appear on this map:

- (a) Hacienda Punta (now Central Canovanas)
- (b) Ingenio
- (c) Hacienda Buena Vista - 5 structures
- (d) Hacienda Monserrate
- (e) Hacienda Carmen - 5 structures
- (f) Hacienda San Justo - 14 structures
- (g) Hacienda San Luis - 8 structures
- (h) Hacienda San Jose - 1 structure
- (i) Hacienda Santa Barbara

The following plans are also part of this file:

- (a) Plan of the Loiza River Canal tracing
scale 1 - 2,000, 1898. Eng. F. Larrinaga
- (b) Plan of the Derivation Channel -
scale 1 - 2,000, 1898. Larrinaga
- (c) Plan of the Loiza Channel - profile cuts
1898, Larrianga
- (d) Plan of the Rio Loiza Channelization dam
scale 1 - 500, 1898. Larrinaga

2. Legajo 245, caja 474

File concerning the Reus Channel. Civil charges by
Don Carlos Wuagneax against several debtors of the
Reus Channel Enterprise.

3. Legajo 244, caja 473

- (a) File on the Reus Channel, dealing with the construction of a navigation channel in the Rio Grande, 1847-1848; 1848-1849; 1849-1854; 1854-1859.
 - (b) File concerning the opening of a channel between La Puerta and Vacia Talega, Loiza, 1844-1847.
4. Legajo 96, Caja 441. File #10, started by Don Guillermo Korber soliciting the use of water from the Rio Grande de Loiza, Caguas jurisdiction, in a locality called El Pefon, San Anton Barrio, December 7, 1898.

B. Serie Propiedad Pública - (Public Property Series)

As was explained in an earlier section of this report, this series is not indexed by subject, but rather ordered alphabetically in boxes. It is an important source for information concerning land grants, concessions, transfers, etc. The material on Loiza totals 14 boxes, numbered 99 to 112. A cursory glance through some of these indicates that there is a reasonable number of documents concerning land grants in many of the Loiza barrios, e.g. in Mediania, Los Frailes, Casanovas, Cubuy, etc.

C. Serie Obras Municipales (Municipal works series)

A search through this series yielded the following information for Loiza:

Legajo 40, caja 240 contains the following:

1866)	
1872)	Jurisdictions
1901)	
1826 - 1876	Casa del Rey
	Cemetery
	Casa Consistorial (Town Council?)

D. Serie - Caminos vecinales (Neighborhood Roads series)

1. Leg. 40, caja 1423 - 1834 - 1929
2. Leg. 178, caja 1547 - 1933. Concerning a bridge over the Rio Grande de Loiza on the Carraizo road.
3. Leg. 210, caja 1563 - 1935-53
4. Leg. 357, caja 1626 - 1946-51 Rio Canovanas bridge
5. Leg. 474, caja 1689 - 1942-54

II. Fondo Departamento de Hacienda (Treasury Department Repository)

A. Serie - Tasación (Land appraisal series)

There is an entire series of aerial photographs, mostly taken in 1936, for the Rio Grande and Loiza area. They are located under Carolina, in Box 7 of this series. Some are quite good, with clear views of the river, its mouth, and also of the Karst topography of the Loiza valley.

III. Fondo Documentos Municipales (Municipal Documents Repository)

This Repository has not been indexed. A preliminary inventory has been prepared for the Loiza material, which consists only of 4 legal boxes of documents. This repository probably does not offer much potential for the Loiza area proper.

FIELDWORK AND RESULTS

Because the proposed project covered such an extensive area and because the nature of the potential impacts remained undefined, the actual reconnaissance was limited simply to spot checking areas of known sites as well as

areas of high probability for site locations. A number of considerations determined which areas would be spot checked. For example, Miguel Rodriguez had indicated that he had been having considerable success utilizing the maps which depict the modern flooding regime in the area as a means of predicting site locations, i.e. areas which remained above the flooding limits were consistently yielding archeological sites.

Discussions with Rodriguez as well as a check of the site files and Rouse's (1952) report yielded 16 prehistoric sites located in the immediate vicinity of the lower project area, here defined as the area on the USGS topographic map bounded on the east and south by the map margins and on the west by the town of Carolina and Laguna de Pinones and on the north by the Atlantic Ocean. Visits were made to Cueva Maria la Cruz and Hacienda Grande to assess their integrity. As has been indicated previously substantial portions of both sites remain unexplored and both sites are considered eminently eligible to the National Register.

Shortly, the Office of Cultural Affairs intends to perform test excavations and Cueva Maria la Cruz to obtain sufficient documentation for its nomination to the National Register. The State Historic Preservation Officer also indicated Hacienda Grande would be recommended as eligible by his office. Peter Roe, of the University of Delaware, is currently testing and producing a topographic map of Hacienda Grande.

Field observation of Hacienda Grande and the literature review accentuated the realization that historical archeology in Puerto Rico is in a nascent stage. The hacienda itself is not considered in the above literature cited or any other located archeological discussion of the site, although Alegría did mention a test excavation which produced historic material (personal communication).

Historic features observed on the site included a caliche foundation approximately 6 cm in height above the present surface. Within 2 meters of the southeast corner of this feature what was interpreted as a well or cistern was encountered. The surface within each of these features

appeared undisturbed. Other brick remnants were also observed. Additionally, Carbone has heard reports of amateurs recovering a coin minted in the 1740's from this vicinity.

Other areas visited in this portion of the project area were located on the eastern margins of the town of Carolina. Two areas were visited - the western extreme of the limestone hill remnants labelled on the topo map as Hoyo Mulas. This area is now the municipal dump. Rodriguez has reported a number of shell middens on the north side of this chain of hills. It is likely that these hills as well as the scattered remnants which stand out in the swampy and mangrove area to the north all contain a number of prehistoric sites. Further south in the area, east of the town of Carolina which is currently occupied by squatters, a site was reported on a slight knoll in a partly wooded field on the north bank of the river. This whole area apparently represents a series of old meander scars with oxbow remnants indicating that the river has been fairly active for quite some time. The site is located on what appears to be a rather old remnant of the original landscape which has not been too affected by the shifts in the river's channel. The site is reportedly a ceramic site although we were unable to obtain access. The site information is apparently in the files of the Fundacion Arqueologica. Included in this entry is information concerning the existing chimney of a sugar mill, presumably built during the nineteenth century.

The last area to be visited in what is here considered as the lower reach of the Rio Grande were the bottoms just north of Trujillo Alto where the Cuevas site is located.

The Cuevas site is situated on a meander in a stretch of bottom which is heavily industrialized. The Cuevas site served as the classic type site for the original definition of Saladoid components in Puerto Rico. Rouse excavated here in the thirties and commented that the site contained the deepest stratified deposits of all the sites excavated by him at that time.

Much of the site is now under the large warehouses and factory which occupy much of the bottomland but during our visit we were able to inspect the area on both sides of the railroad cut. This cursory examination of the profiles revealed that the stratigraphy described by Rouse is relatively intact and that there are still substantial portions of the site which remain to be evaluated. Evidence was also found of recent pothunting activity. Shovel cuts were visible in the profiles and piles of undecorated sherds were scattered about representing the disappointing returns of a pothunter's labor.

In 1977 an exciting discovery in this area was made by Miguel Rodriguez approximately 500 meters upstream from the original Cuevas site. Construction activity in the area revealed the presence of a series of ball courts and other stone constructions in association with considerable shell refuse and midden deposits. Unfortunately the developers bulldozed the site before any really systematic work could be carried out. The investigations therefore were limited to recording of the more visible remains as well as surface collection of ceramic and lithic material and faunal remains.

According to Rodriguez (1978) most of the ceramics from the site are of the Capa style, a late ceramic manifestation, although some fragments of Ostionoid and Elenoid ceramics were also recovered suggesting the possibility of stratified deposits. Another interesting discovery at the site was a copper coin minted in Seville between 1500-1504 for circulation in the Dominican Republic. This suggests the possibility that the site may have been occupied into historic times, a feature which is characteristic of a number of Capa sites.

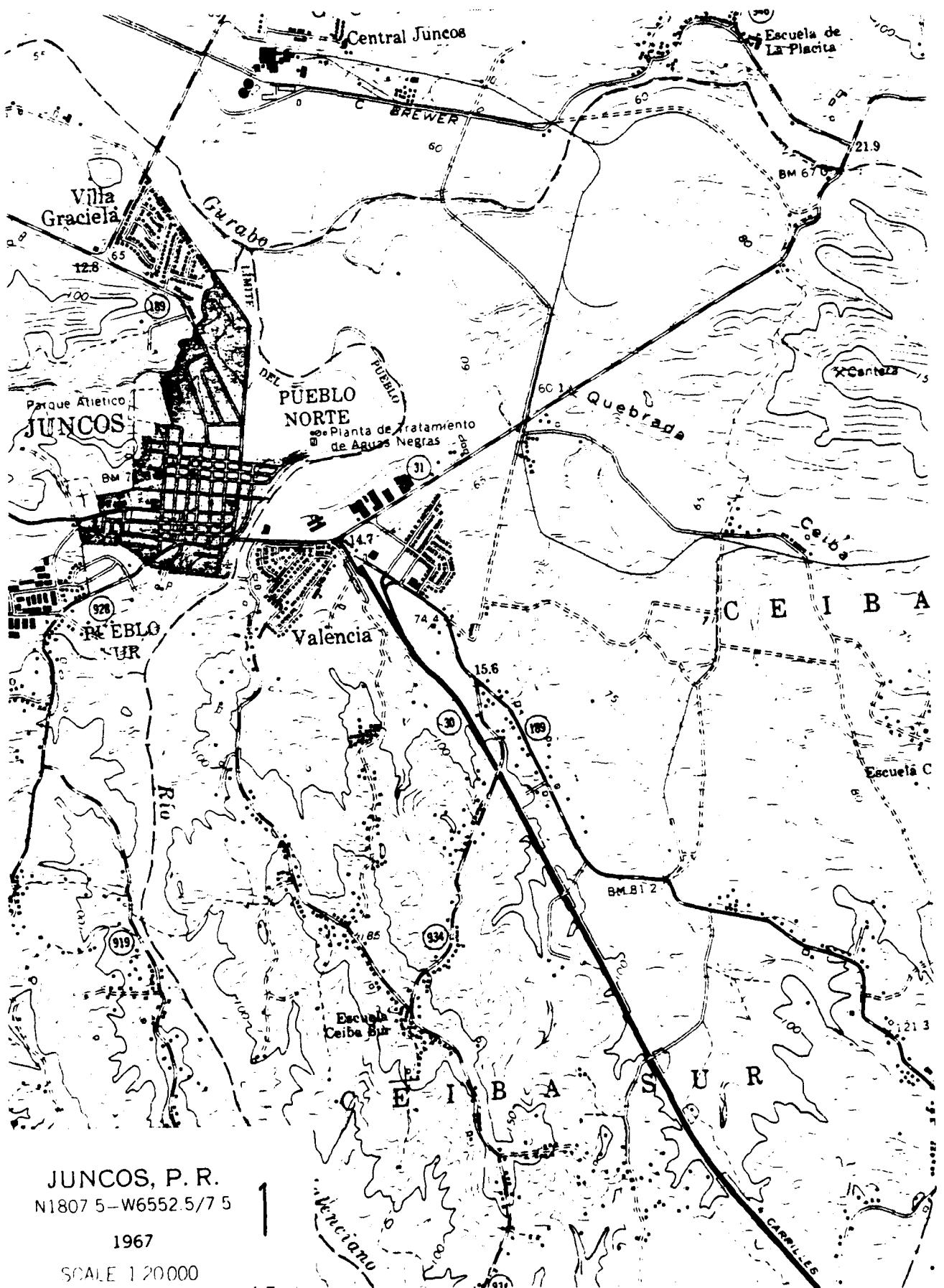
With respect to project specific impacts, any channelization work in this section of the river would have a significant impact on the remaining portions of these sites.

A number of other segments of the upper Loiza drainage were also spot checked. These included several bottoms just north of the town of Gurabo

near the sewage treatment plant on the Rio Gurabo. Several fields were walked, a number of bank profiles were examined, and several informants fishing along the river were asked if they had any knowledge of Indian sites in the vicinity. The fields in the vicinity of the sewage treatment plant had been considerably modified by construction activity and had a number of pools with standing water in them. No evidence of prehistoric occupation was found in any of the brief walkovers.

The last segment to be checked was a stretch of the Rio Valenciano southeast of the town of Juncos. In Juncos, the big bend which the Rio Valenciano makes before it enters into the Rio Gurabo was checked, and a number of profiles were photographed along the bend. The next area checked was the Central Juncos on the north bank of the Rio Gurabo and a number of dirt roads both east and west of the Central. To the west, following more or less the route of the old railroad as shown in Figure 9. The area is mapped in the soil survey manuals as Toa silty clay loam and is described as being moderately permeable (Figure 10). Most of the areas that were walked, however, were totally waterlogged, perhaps on account of the unusually heavy rainfall in late 1979. The bed of a creek bisecting one of the fields was walked and profiles were photographed. The profiles fit well within the Toa silty clay loam descriptions, being deep and fine textured.

A visit to the Mayor's office in Juncos yielded an informant report on the existence of cuevas de indios in the Ceiba Sur area south of town. This area is slated for potential reservoir construction, therefore on the basis of the informant report an area was selected on the topographic map displaying steep contours and a narrow gorge-like configuration just below the proposed reservoir, to check for the possibility of rock shelters. Both sides of the Rio Valenciano were walked and photographed. An attempt was made to climb a number of highly promising overhangs and vertical rock faces. On the way up a number of large smooth convex rock exposures which dotted the hillside were checked for petroglyphs or pictographs but none were noted. One of the vertical rock faces was observed but no material was spotted due to the dense vegetation mat. On the way down an informant was encountered fishing in the river. When questioned about Indian sites he mentioned the existence of piedras del indio in the area of Ceiba Sur.



JUNCOS, P. R.
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SCALE 1:20000

FIGURE 9. Location of Ceiba Sur.

In summary, both the literature search and field reconnaissance of the project area have amply demonstrated the existence of a wide range of prehistoric cultural resources spanning the entire range of Puerto Rican prehistory.

RECOMMENDATIONS

Archeological

Correction of flooding problems on the Rio Grande de Loiza and its tributaries will be a major project. Although various techniques in several alternatives are presented in the official reports, the most feasible appears to be the construction of ring levees around the towns susceptible to flooding. A minimum of 4 potential impacts to cultural resources can be projected when and if this project begins construction.

The levees may cover archaeological sites and/or cause the relocation of significant structures. Hacienda Grande and Cueva Mariala Cruz in the town of Loiza Aldea may be impacted in this fashion. Borrow areas for the construction of levees may come from upland areas not covered by this reconnaissance. Construction staging areas along with construction access can be significant impacts since they are often omitted from a cultural resources survey. Numerous known sites are present which must be considered if they are in the impact zone.

Documentary research conducted during this reconnaissance has shown a high concentration of the sugar cane industry in the Loiza drainage during the nineteenth and early twentieth centuries. Remains of this agricultural industry are evident in the project area as railroads, railroad bridges, sugar centrales, nineteenth century mill chimneys, and irrigation canals. Others not observed are likely to be present. These may be eligible for the National Register of Historic Places and those within the impact area should be included within a cultural resources survey. The archival recommendations for this aspect should be completed prior to the field survey so as to provide information on their location and extent.



FIGURE 10. Soils Mosaic, Gurabo.

Site specific recommendations are offered for these areas, the southern fringes of the town of Loiza, the left bank of the river just north of Trujillo Alto and Ceiba Sur near Juncos.

Loiza

Two archeological sites are known in this area, the Cueva María la Cruz and Hacienda Grande.

Often an impact, public use areas, may also be an avenue of preservation. Locally oriented recreation areas are rare or nonexistent within the project area and are considered in the project goals. We recommend Cueva María la Cruz as one such area. Properly planned and constructed, a public use area here could interpret and protect the site and benefit the people of the area.

From all project alternative maps perused in the San Juan Area Office, Hacienda Grande will be impacted or will be in proximity to an action. Goals of survey in this area should be delimitation of the site area by subsurface checks. Site limit information should be accurately tied into the horizontal grid to be used by the project to determine impact or to physically flag the site for avoidance. Historic archive work will be necessary to interpret the caliche foundations present on the site.

The significance of both of these sites cannot be overemphasized and if they were to be impacted a considerable amount of money would be required for any mitigative efforts. The area is also very rich in historic sites and a complete intensive survey and archival search would be required to track down their location and distribution.

Trujillo Alto

If impacts are scheduled for this area similar actions should be undertaken at the archeological site of Cuevas as are recommended above for Hacienda Grande.

Ceiba Sur

If the reservoir alternative for the Rio Valenciano continues to be viable, it is recommended the area labeled on the USGS Juncos Quadrangle as Ceiba Sur be subjected to an intensive survey to locate possible caves, rockshelters and petroglyph/pictograph sites. The local lore abounds with references to their existence and the early references (e.g. Fewkes) attest to their veracity.

More specific recommendations on the Rio Grande de Loiza Project are difficult due to the cultural resource complexity reported above. With this project, it is sufficient to say once potential project impacts have been more narrowly defined, a systematic intensive surface and subsurface survey of the project area should be undertaken to identify all of the cultural resources which may be impacted.

Archival

The Loiza river valley is a very important area in the prehistory and history of Puerto Rico. It was one of the earliest areas of settlement in the island, both in the prehistoric (e.g. the sites of María la Cruz and Hacienda Grande) and historic periods. The Loiza River was a source of gold during the early sixteenth century, and the area also participated in the initial establishment of mills for the production of sugar. This area also participated in the nineteenth and twentieth century development of the sugar industry. All these factors contribute to make the Loiza valley a very important cultural resource area.

This potential is further increased by the fact that the Loiza project area includes sections of the Caguas Interior valley. Even though it was not settled until the late eighteenth and early nineteenth centuries, it serves as a contrast to the lower, coastal drainage areas of the Loiza River. This suggests a large number of research problems that could be investigated in a comprehensive cultural resources survey of the entire area. As an example, the socio-economic development of the two areas could be compared in terms

of the founding and development of towns, the important urban and rural structures, population figures, agricultural practices, development of road communications, access to available resources, etc.

In order to cover the entire project area, an in-depth literature search must be carried out that includes the municipalities of Loiza, Canovanas, Carolina, Gurabo, Juncos, and San Lorenzo. This will require a large amount of time due to reasons discussed above. In this case, it is compounded by the number of municipalities that must be studied.

The data documented in this report should serve as a starting point for further work. Many of the nineteenth century documents that may provide data on the Lower Loiza Valley have been examined:

A. Public Works Repository

1. Water series

The exact location of documents pertaining to the Loiza area has been provided, and the type of information available from these documents has been discussed. Future investigations should include a thorough reading of these documents to gather more detailed data concerning water projects in the area, location of sugar haciendas, names of property owners, succession of property rights, etc. This information could provide clues for the location of some of the remains of these haciendas. Many areas, such as central Canovanas and Monserrate, are probably the original locations of haciendas of that period.

2. Public Property Series

The location of the Loiza material has been provided. Further investigations should focus on studying a sample of the 14 boxes of documents concerning land grants, ownership of lands, transfer of property rights and maps and plans of properties for this

area. It is expected that the information gained from these two series should provide ample data for reconstructing the pattern of land and water use during the nineteenth century.

3. Neighborhood road series

The location of the documents of this series that are relevant to Loiza has also been provided. These should also be examined in future investigations.

- B. The series of 1936 aerial photographs located in the Department of the Treasury Repository, Land Appraisal Series, should also be consulted by future investigators.

These series should also be consulted for information on the other municipalities that form part of the project area. A check of documents covering other important rivers within the project area should also be carried out, since the most important manner in which the water series documents are organized is by river drainage.

Besides these sources, other principal archive repositories should be examined as well. A list of these was provided in an earlier section of this report.

The early historic sources should also be examined, especially for the Lower Loiza Valley area. Focus should be placed on gathering specific information that may help to locate the sites of the early ingenios and haciendas in the area. Ethnohistorical sources might also be helpful here, as well as the collections of documents pertaining to the first century of colonization.

An effort should also be made to compile information concerning maps of the area, which would be very helpful to document the urban development of the project area, the establishment of major roads and/or highways, the channelization and/or diversion of rivers, etc.

RIO TALLAOA

ENVIRONMENT

This project area is located on the south coast of the island to the west of the city of Ponce and centered around the town of Peñuelas. Environmental conditions on this part of the island are totally different from those encountered north of the mountain divide. Whereas the north coast is amply supplied with rain throughout most of the year as you cross the divide rainfall drops abruptly with a mean annual precipitation in the Guayanilla area of about 35 inches with the area generally experiencing long periods of drought. The influences of this abrupt change in climatic regime on the overall environmental situation as well as its implications for prehistoric settlement and subsistence will be discussed in detail below.

Geology

Mitchell (1922) describes the general features of the Ponce District, of which the project area is a part, consisting of three major physiographic units:

(1) A mountainous area which represents the westward extension of the Cordillera Central, rising to over 3600 feet elevation in the Adjuntas area.

(2) A heavily dissected coastal plain of Tertiary sediments which have been faulted over the older rocks and which fringe the south coast. These deposits are cut into a number of isolated remnants by streams flowing into the Caribbean.

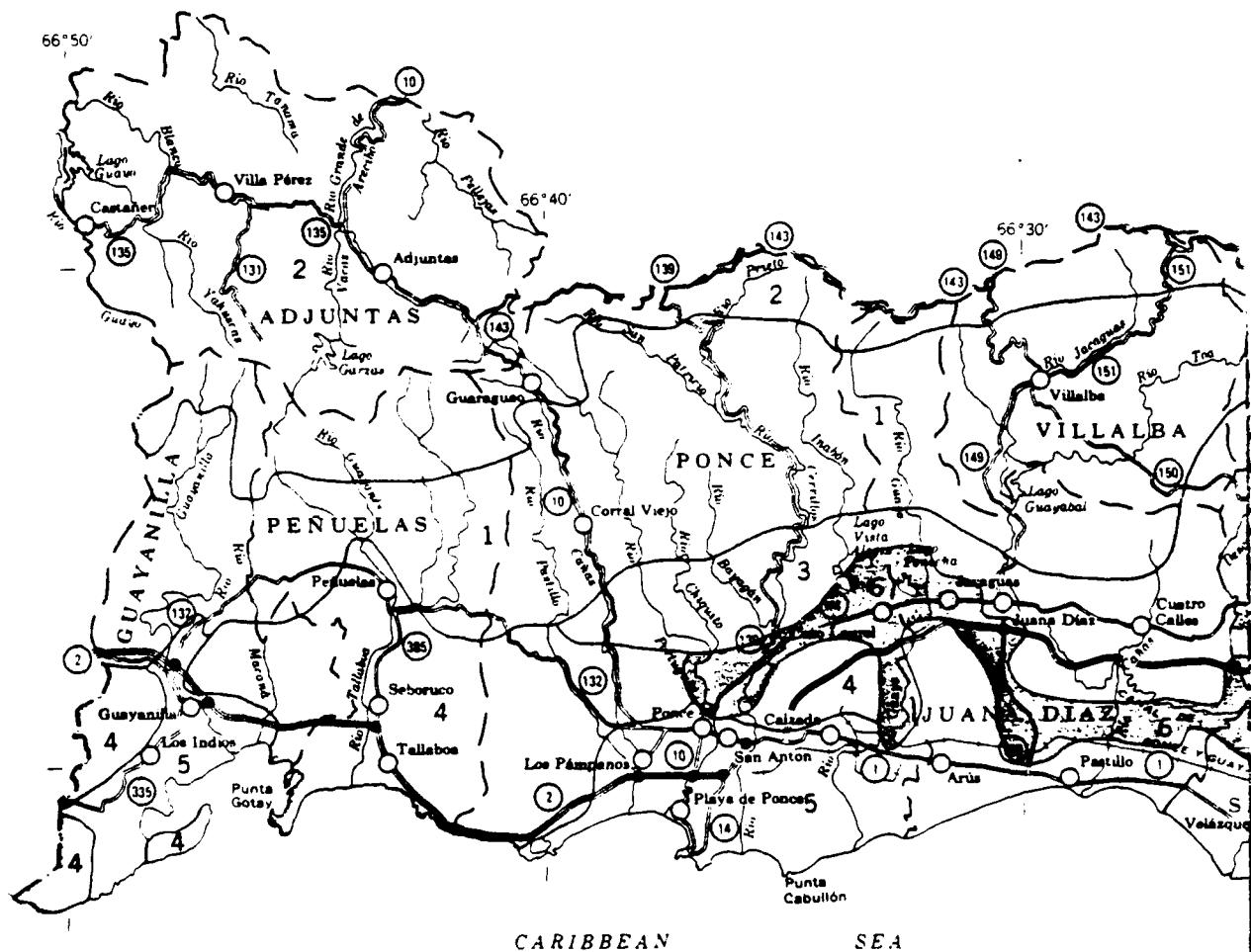
(3) Lowland areas, some quite extensive, occupy present and former river valleys and stretch along the coast in broad, gently seaward sloping plains, called playas. The most striking of such lowlands are the valleys between Yauco and Boqueron and the valley of the Guanajibo River. The upper

portion of lithologic cross sections east and west of Peñuelas consists of series of interbedded shales tuffs and limestone, of Cretaceous age while the lower portion represents the Tertiary chalky limestones of the Ponce formation. Alluvial deposits in the area consist of an earlier Pleistocene group of gravels, mud, and silt occurring along the present river valleys but at generally higher elevations than the more recent deposits of the same character which mantle the present river floodplains and playas. Of particular importance to prehistoric populations is the presence in the Cretaceous deposits of irregular masses of chert. In general the chert occurs in the shales and tuffs and is of a generally good cryptocrystalline character. These deposits provided the major source of good workable raw material for the manufacture of stone tools - such as knives, scrapers, etc.

Soils and Hydrology

The soils in this project area are of two major types as shown in Figure 11. The lower segment of the area is predominantly covered with soils of the Aguilera-Tuque association. These soils have developed in a semiarid environment and are described in the Soil Survey manual as steep and very steep, well drained, moderately alkaline, loamy, and clayey soils that have gravel and stones over limestone; on foot slopes, side slopes, and hilltops on the limestone uplands." (SCS, 1979.)

The upper part of the drainage is mantled by soils of the Caguabo-Mucara-Quebrada association which have developed in a more humid environment. These soils are described as "moderately steep to very steep, well drained, medium acid to neutral, loamy and clayey soils over weathered and hard rock on side slopes and ridges on the volcanic uplands." The detailed mosaic of soil series in the project area shows that the lowlands bordering the rivers consist of soils of the Constancia-Jacaguas-San Anton association. This association is described as comprising "nearly level, somewhat poorly drained and well drained, neutral to moderately alkaline, loamy and clayey soils that are deep or shallow to sand and gravel; on river floodplains." (SCS, 1979.) Figure 12 shows the detailed soil mosaic.



C A R I B B E A N

S E A

Each area outlined on this map consists of
more than one kind of soil. The map is thus
meant for general planning rather than a basis
for decisions on the use of specific tracts.

FIGURE 11. Soils of Western Puerto Rico.

The soils in the lower portion of the Tallaboa south of the petrochemicals complex on Route 127 belong to the Constancia series, specifically, Constancia silty clay. These soils are somewhat poorly drained and are difficult to work although they can be cultivated with draining and irrigation. Upstream, north of Route 2 San Anton and Jacqua series soils border the river while the uplands are all under Aguilera-Tuque soils. The Jacagua soils are formed in 'moderately fine textured' over coarse textured sediment that washed from volcanic and limestone hills,' and are relatively easy to work. The other major soil unit in this section is the San Anton clay loam. These soils are generally on alluvial fans. They are formed in medium textured and moderately fine textured sediment derived from limestone and volcanic rock. According to the survey manual, these soils are not subject to erosion and can be used for intensive cropping without loss of soil material. (SCS, 1979.)

Immediately south of Peñuelas, the Tallaboa makes a sharp turn to the east of the point of confluence with the Guayanés. The bottomlands flanking the Tallaboa continue to be mantled with the finer textured San Anton and Toa soils (described in the Puerto Nuevo section) with some pockets of Reilly gravelly loam. This Reilly series consists of excessively drained nearly level soils. They are generally underlain by stratified layers of sand and gravel, and in some situations the surface layer may also contain stones and cobbles. A substantial portion of the Guayanés floodplain is also mantled by Reilly series soils.

Vegetation

The character of the vegetation on the south coast is radically different from that on the north coast. As Gleason and Cook (1926) describe it:

The differences between the plant life of the northern and the southern portions of Porto Rico are fundamental and apparent even to the casual tourist. On the northern side, although differentiated into numerous plant associations of very different appearance and structure, the vegetation forms a connected whole and its distribution coincides exactly with the extent of the Tertiary coastal plain. On the south side, the coastal plain is much smaller in area, rocks of Cretaceous age



FIGURE 12. Soil Mosaic of the Penuelas Area.



FIGURE 12. Continued.

come down to the Caribbean sea over about half the length of the island, and the typical vegetation covers not only the Tertiary rocks but also extends far up into the central mountain mass. On the northern side, the principal environmental factor in the differentiation of the vegetation is the nature of the underlying soil or rocks, and the climate has only a broad general effect. On the southern side, the chief environmental features are the low rainfall and long droughts and the nature of the soil is of only subordinate importance. Many species and a few plant associations extend over various soils indiscriminately, whether volcanic, limestone, shale or fluvial outwash.

(Gleason and Cook, 1926)

In the southwest coast area therefore the various types of landscapes, grouped according to vegetation rather than in terms of the geology can be summarized as follows: (1) The mountains whose origin is mainly volcanic; (2) the lower shale and/or limestone hills of Cretaceous and/or Tertiary age; and (3) the lowlands comprised of outwash plains and valley alluvia. Three other types of environments which are represented in generally small segments are the fresh water marshes in the Lajas valley, the sand or shingle beaches and the mangrove swamps. As will be shown later, although these are of secondary importance in terms of their extent and distribution, they played a very significant role in the prehistoric life of the peoples of the southwest coast area.

From the faunal point of view and in terms of significance to the prehistoric diet, these secondary environments were probably the most important. Hundreds of prehistoric middens are scattered about this region which contain the remains of a rich molluscan and crustacean fauna as well as the bones of mammals (Isolobon) and birds from inland habitats.

PREHISTORIC BACKGROUND

The southwest coast of the island contains perhaps the highest density of prehistoric sites on all of the island, as well as some of the most significant, for example, Tecla, Tibes, Canas, Las Cucharas, Ostiones. According

to Rouse, as of 1936, 'the south coast area has probably been more thoroughly surveyed than any other part of Porto Rico.' (Rouse 1952:515.) The same statement is equally applicable today since members of the Sociedad Guaynia and the Fundacion Arqueologica del Suroeste have been actively pursuing investigation of sites in this area for quite a number of years. The entire sequence of Puerto Rican prehistory is represented by the sites on the southwest coast. It was in this area where Rouse discovered his type site of Coroso which led him to postulate the existence of a preceramic population on the island. Numerous preceramic and/or aceramic shell middens are scattered about the coast generally on the margins of mangroves and lagoons. The area is also rich in good quality cryptocrystalline lithic materials such as chert, flint, and jasper which were extensively exploited by both preceramic and ceramic populations for the manufacture of stone tools.

The ceramic period is represented in the area by a number of major finds including Tecla which is in the immediate vicinity of the project area in the Central Rufina in Guayanilla. This site has been described at length in Appendix A. A high site density is suggested for the Tallaboa and Guayanes drainage by a perusal of Rouse's field notes which indicate quite a large concentration of sites, especially in the area of Barrio Santo Domingo (see listing Table 5).

TABLE 5

Listing of sites in the Peñuelas area from Rouse's Field notes:

1. Peñuelas - Barrio Cuevas - 2 miles SSE of Peñuelas. Cave; east of the railroad.
2. Peñuelas #1 - shell heap; Barrio Tallaboa; surveyed 8/7/37; Montalvo Guenard.
3. Peñuelas #2 - Shell heap; Barrio Tallaboa Alta; Sitio Caracoles; Near K250 H4 of carretera; surveyed 8/6/37; Montalvo Guenard.
4. Peñuelas #3 - shell heap; Barrio Santo Domingo; Finca of Don Pepe Marcucci at K245 H7 of carretera; surveyed 8/8/37; Montalvo Guenard.

5. Peñuelas #4 - shell heap; Barrio Santo Domingo; Finca Pepe Marcucci; Surveyed 8/8/37; Montalvo Guenard.
6. Peñuelas #5 - Shell heap; Barrio Santo Domingo; near K245 of Carretera.
7. Peñuelas #6 - Cueva del Maiz; Barrio Santo Domingo; surveyed 8/8/37; Montalvo Guenard.
8. Peñuelas #7 - shell heap; Barrio Santo Domingo; near K245; Fica Sucursal Castellar; on right (north) side of Carretera at K245 H3.
9. Peñuelas #8 - shell heap; Barrio Santo Domingo; Finca Don Luis Migaglion; surveyed 8/8/37; Montalvo Guenard.
10. Peñuelas #9 - shell heap; Barrio Santo Domingo; Finca Bartolo Foncet.
11. Peñuelas - Ball court 5 miles north in mountains; well preserved; inquired 8/8/37; not found; Rainey.
12. Peñuelas - Ball court within 100 yards of town.
13. Peñuelas - shell heap; Barrio Santo Domingo; Finca Loyolo; near K245 of carretera; surveyed 8/8/37; nothing found; Montalvo Guenard.
14. Peñuelas - shell heap; Barrio Santo Domingo; Finca Don Luis Jordan; at K246 H5 of carretera; surveyed 8/8/37; nothing found; Montalvo Guenard.

A recent attempt has been made by the Sociedad Guaynia to locate many of the sites in Rouse's notes. They are described as follows:

PE-1 - Caracoles - Barrio Cuevas; Destroyed; located under the modern baseball park; found shell, ceramics; artifacts made of shell, and stone as well as ceramic fragments-Ostionoid-Chicoid.

PE-2 - Coto - Barrio Tallaboa; refuse heap with small deposits of shell without ceramics; located on top of chain of low hills of medium elevation; shell and lithic materials made on flint.

PE-3 - La Jagua - Sector La Jagua; concentrations of shell and ceramics; located on a bottom of the Rio Guayanés; terrain modified for selling off in parcels; shell, ceramics; bones, burials, few lithics; Ostionoid.

PE-4 - Olefinos - Barrio Tallaboa; located in petrochemicals complex; small shell heap, 'camp site'; Chicoid ceramics; heavy erosion.

PE-5 - El Oregano - Barrio Santo Domingo; small cave; two petroglyphs; visited by Rainey.

This brief enumeration serves to confirm the existence of sites in the project area which span the entire range of Puerto Rican prehistory from the preceramic to the late prehistoric period.

HISTORIC BACKGROUND

Local History

The town of Peñuelas is located in the south coastal valley of Tallaboa, between Ponce, Adjuntas and Guayanilla. The area encompassing the municipality of Peñuelas comprises 14 barrios including the communities of Tallaboa and Tallaboa Alta. It is drained by 5 small order rivers and various streams. The main rivers are presently known as Barrizal or Barreal, Guayanés, Joya, Jobos, and Tallaboa. The Guayanés and Tallaboa Rivers flow into each other just south of Peñuelas in a locality known as Cuebas. From this point downstream the river is called the Tallaboa, and it flows south into Tallaboa Bay.

The Tallaboa area was settled around 1745, when a group of settlers established itself in the coastal area around the Bay, gradually expanding into the interior sections of the valley (La Gran Encyclop. de P.R., 1976). A 1776 description of the Tallaboa area by Fray Inigo Abbad y Lasierra pictures it as a fertile territory with ample tree groves and pasture lands inhabited by 80 settlers from Ponce (1959: 141).

In 1793, the community was officially established as a town. Land grants were handed out to early settlers in 1824, among others to Francisco Subira,

Bartolo Bauza, Diego A. Castellar and Jaime Costas (*La Gran Enciclopedia de P.R.*, 1976: 241-42). These names appear in later nineteenth century documents concerning the concession of permits to divert water from the Tallaboa River for purposes of irrigating haciendas principally involved in cane cultivation.*

As was true of all Puerto Rican nineteenth century towns, the main economic activity in Tallaboa was agriculture. Cane cultivation was important, but products such as coffee, plantains, rice, maize, and minor roots and vegetables were also grown (*Descripción topográfica de Peñuelas*, 1846: 217).

The transportation system consisted of two main roads (*Caminos Reales*) and a series of neighborhood roads. The two main ones went from Peñuelas to Ponce and from Peñuelas to Guayanilla and Yauco (*Descripción topográfica de Peñuelas*, 1846: 215). The smaller neighborhood roads served to connect the rural barrios of the municipality and included the Tallaboa road which extended to the coast and then continued to Ponce (*Descripción topográfica de Peñuelas*, 1846: 215).

The nineteenth century hacienda maps located at the AGPR illustrate these roads and could be used to reconstruct their locations.

Information concerning the town structures is provided in an 1874 description by the historian Ubeda Delgado (*La Gran Enc. de P.R.*, 1976: 242). The town consisted of 9 streets, a church which was built in 1851, the Casa de Ayuntamiento (City Hall), Casa del Rey, a butcher shop, police station and two schools.

*AGPR, O.P. Serie Aguas, Subserie Riego. This information will be discussed below.

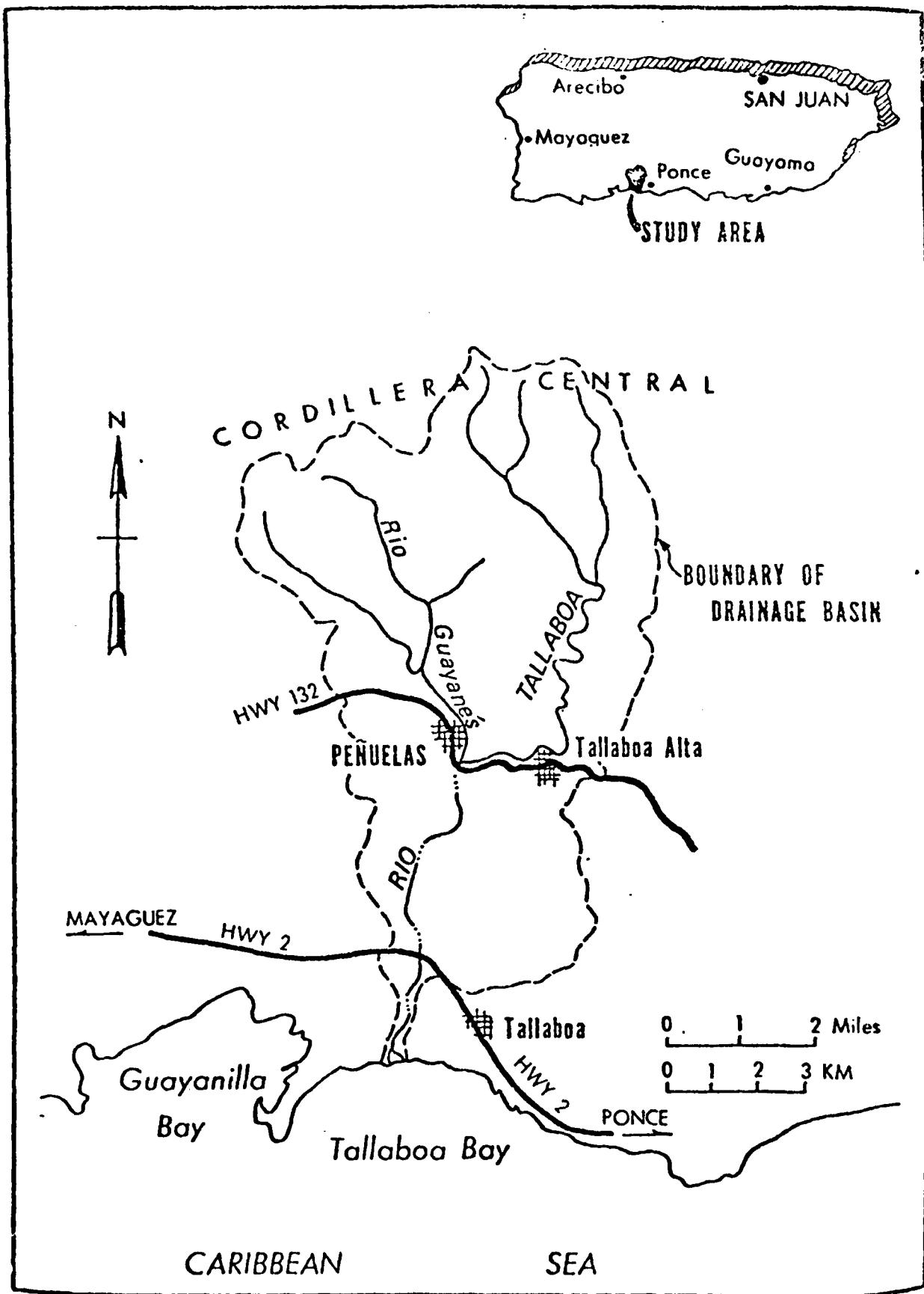


FIGURE 13. Location of Tallaboa River Basin.

The second half of the nineteenth century saw the growth of the sugar industry and the establishment of many sugar mills in the Tallaboa area (La Gran Enciclopedia de P.R., 1976: 242). By the turn of the century, sugar, coffee, tobacco, and minor fruits and vegetables were the main source of livelihood.

As was discussed in previous sections of this report, during the twentieth century most of the sugar ingenios were displaced by large centrales administered by the United States.

The 1940's shift toward industrialization drastically changed the Tallaboa area. Starting in the 50's and 60's, this agricultural municipality was transformed into a center for heavy industry with the establishment in the Tallaboa Bay area of petrochemical plants such as Corco, PPG and P.R. Olefins. Agriculture is now of minor importance.

Background and Literature Search

The background literature search for this project again concentrated on the repositories housed in the General Archives building in San Juan (AGPR). The water series of the public works repository proved most useful for the Tallaboa area. A wealth of information pertaining to the nineteenth century haciendas in various sections of the Tallaboa and Guanajibo river valley was unearthed. Information concerning the families that owned these haciendas, the buying and selling of land, the irrigation system developed for the haciendas, the name of the haciendas, their size, the number of structures, the number of acres devoted to different crops, the number of acres devoted to pasture and fallow lands, the engineering plans for the construction of dikes, dams, etc., are all available in these documents.

The following is a breakdown of the documents of this series relevant to the Tallaboa area. The principal contents of each document and exact location in the archives are given.

I. Fondo Obras Publicas, Serie Aguas, Subserie-Riego

A. Legajo 172, Caja 458.

File concerning a project for an irrigation channel to fertilize the lands of the Hacienda Pepita, property of the Cabrera Succession, Peñuelas. 1867. Includes a map of the project. Eng. Francisco Valls.

File concerning reforms to be made in the module of the Hacienda Pepita, Peñuelas, 1883-84. Includes plans.

B. Legajo 173, caja 458. Exp. 722. File #722 concerning a project for an irrigation channel to fertilize part of the Hacienda Buena Fe, property of the D. Jose Ma. Rodriguez Succession, Peñuelas.

1. Includes a general plan, detailed and in good condition. The plan indicates pasture areas, irrigated areas, names of local owners, location of houses and location of the river and stream. Dated 1870. Scale 1 - 4,000 meters. Engineer F. Valls.

2. Also includes a detailed plan of the irrigation structures. 1870, Scale 1 - 100. Eng. Valls. File #99 includes a sketch entitled Sketch of the Tallaboa River with its affluents and locations for the channels. This map illustrates the Tallaboa River in its course toward the sea, plus its affluents: Barreal, Guayanés, Jobos, Ladera stream and Rodriguez stream. It shows the locations along the river from which the drawing of water, modules or canals is projected. It mentions the names of what appear to be the hacendados which will benefit from the establishment of the irrigation project: e.g., Brun, Rodriguez, Cabrera, Costa, Valdivieso.

C. Legajo 175, caja 460.

1. File #774 concerning a project to use the waters of the Tallaboa River and channel for irrigating the Hacienda Dolores. Owners - Valdivieso brothers. Bo. Tallaboa Abajo, Peñuelas, 1882.
Includes:

(a) Horizontal plan of the project. Shows the river, from the confluence of the two affluents to the sea. All this area appears as being owned by the Valdiviesos. The plan also shows the location of the land to be irrigated and the irrigation channels, structures, etc. 1882. Scale - 1 - 10,00 m. Eng. Lorenzo Vizcarrondo.

It also includes two other plans of the engineering elements of the project.

2. File #881. Project of irrigation expansion for the Hacienda Dolores of Valdivieso Hmnos to incorporate newly acquired lands. It describes the property and its location.

It includes a plan of the Valdivieso property. The Tallaboa River appears here as the Peñuelas River. The names of the families from which lands were required are given, i.e., Bausa, Ferrer, Pelletier. It shows the channel of another hacienda, called the Hacienda Julia, plus the Royal Road to Tallaboa, a neighborhood road, a public road, and the location of several structures, 1885. Eng. F. Valls.

The file also includes articles describing the conditions and rules that should be followed by the contractor with respect to the type of soil, lime, stone, and clay to use, etc.

3. File #116. Concerning the irrigation of the haciendas Dolores and Julia, owned by the Valdivieso brothers. 1869. Includes:

- (a) A map of the Tallaboa river basin which shows the location of the Guayanés River, the Tallaboa River, the old road from Peñuelas to Ponce, the town of Peñuelas, the Hacienda Pepita, the road from Peñuelas to Tallaboa, the Hacienda Buena Vista (owned by the Costa family), the settlement of Tallaboa, the Hacienda Julia, the Hacienda Dolores, the Hacienda Maria, the road from Mayaguez to Ponce, and the Caribbean Sea. Ponce. July 20, 1869.
 - (b) Plan of the irrigation project for the Haciendas Maria and Dolores. Also illustrates the locations from which other area owners take water. 1869. Scale 1 - 5,000 m.
4. File 193. Project for an irrigation channel module, Hacienda Julia. Includes a plan of the details of this module. May 15, 1883. Eng. F. Valls. Scale 1 - 50 m.
5. File 1030. Irrigation of the haciendas Dolores, Julia and Buena Vista, owned by the Valdivieso and Costa brothers. 1882. Includes:
- (a) Sketch of the module, Hacienda Buena Vista, Bo. Tallaboa, Peñuelas, 1883.
 - (b) Sketch of part of the Tallaboa River and the location of the module for Hacienda Julia.
 - (c) Sketch of a section of the Tallaboa channel and the channel constructed by the Costa brothers. 1883. Scale 1 1 - 500 m.
 - (d) Sketch of a section of the Tallaboa river which shows the relative position of all the locations from which water is taken.

The following information is provided on this map. 1886.

- (1) Pumps
- (2) Tallaboa River
- (3) Road to Guayanilla
- (4) Hacienda Dolores - structures
- (5) Tallaboa channel
- (6) Module and channel - Hacienda Buena Vista
- (7) Acquired lands
- (8) Sugar cane fields
- (9) Module and channel - Haciendas Dolores and Julia
- (10) Barrio de las Cuevas
- (11) Lands of the Hacienda Pepita
- (12) Road to Peñuelas
- (13) Peñuelas
- (14) Guayanés River
- (15) Module and channel - Hacienda Pepita
- (16) Hacienda Emilia - Structure
- (17) Hacienda Buena Fe
- (18) Channel - Hacienda Buena Fe
- (19) Channel - Hacienda Emilia
- (20) Hacienda Buena Vista - Structure

D. Legajo 176, caja 460.

1. File #512. Permit application for irrigation of Hacienda Emilia with waters from the Tallaboa. Owner - D. Simon Brun. Tallaboa Alta River, 1869. Includes:

(a) Plan of the irrigation project. 1869. F. Valls. This includes the location of:

- (1) Tallaboa Alta River
- (2) Location for the drawing of water

- (4) Hacienda of the Rodriguez family - structures
- (5) Railroad - structures
- (6) Irrigated land
- (7) Land to be irrigated
- (8) House
- (9) Owned lands
- (10) Creek
- (11) Quebrada Grande

A quick examination of the documents of this file provides an example of the kind of detailed information that can be extracted from these sources. Hacienda Emilia produced plantains, coffee and 12 acres of cane. We also can learn a little about land transactions. In 1851, Brun bought 142 acres from D. Jose Garcia Castanon which included a house, trees, coffee trapiche, coffee crops, etc. In 1858, Brun bought 4 acres from D. Antonio Valdivieso and in 1859, he bought 3 acres from Francisco Morales. This type of information could prove very useful for future investigations into the history of land use in the Tallaboa area and its relationship to the development of the sugar industry, for example.

E. Legajo 177. Caja 461.

1. File 1447. Concerning the irrigation of some lands owned by Don Clementa Aveno', Hacienda Julia, known previously as Hacienda Esperanza. 1849-60.
2. File 509. Complaint by Maria Josefa Diaz concerning one irrigation channel of D. Francisco Subira of Peñuelas. It includes a sketch of the irrigation channel of the Hacienda Julia in the section that goes through Mrs. Diaz' property. 1868. It illustrates:

- (a) Doña Maria's house
- (b) Channel
- (c) Earth ditch
- (d) Lands of Don Pedro Diaz
- (e) Lands of Doña Juliana Colon
- (f) Lands of Doña Maria Diaz
- (g) Neighborhood road from Peñuelas to Tallaboa
- (h) Plantain and tobacco crops.

3. File 518. Concerning the irrigation of Subira's Hacienda Julia. 1870. Also contains an 1872 document in which the Hacienda Julia is described as a sugar hacienda, owned by Mr. Valdivieso. It includes the following maps:

a. General Plan locating:

- (1) Tallaboa or Guayanés River
- (2) Irrigable land - Hacienda Julia
- (3) Lands previously cultivated
- (4) Structures - Hacienda Julia
- (5) Tallaboa - intersection of the Guayanilla and Peñuelas roads.
- (6) Lands of D. Luis Costa
- (7) Channel of Mr. Subira and sons
- (8) Projected channel
- (9) Lands of Pedro Diaz, Merced Diaz, Jose Acosta, Manuel Diaz, Juanillo Diaz, D. Pedro Bausa, Pablo Hernandez
- (10) Irrigated fields - Hacienda Pepita, owned by Cabrera Bros.

b. General profile of both channels

c. Plan of the dam and the "water take"

d. Sketch of the section of the Tallaboa river in which Hacienda Julia's channel is located. 1884.

F. Legajo 178, caja 461.

1. File 1272. This includes data on the distribution of water carried out by the mayor of Peñuelas as a result of the arguments among the hacendados. It includes:

a. Plan of the Hacienda Pepita owned by the Cabrere Succession. It is an 1871 copy of the 1867 original. It includes an index with the number of areas reserved for crops, streets, plazas, etc. It shows the location of:

- (1) Peñuelas River
- (2) Guayanés River
- (3) projected channel
- (4) pasture areas
- (5) areas of irrigated land
- (6) plaza
- (7) road to Peñuelas
- (8) old river channel

b. Plan of the pasture and sugar cane lands of the Hacienda Buena Vista, owned by D. Luis Costas. 1871 copy by Eng. F. Valls which includes an index enumerating the number of acres of each cultivable area, pastures, streets, etc. It includes:

- (1) Peñuelas River
- (2) irrigated cane fields
- (3) high pasture areas
- (4) low pasture areas
- (5) plaza and streets
- (6) channel and irrigation channel

- (7) road to Ponce
- (8) neighborhood roads
- (9) other adjoining lands

- (a) Subira
- (b) Bausa
- (c) Yrigollen
- (d) P. Diaz
- (e) Rafaela Ocasio
- (f) Pedro Pons
- (g) Pedro Velazquez
- (h) Carmen Martines

Other General Archives documents were consulted for information concerning the Tallaboa/Peñuelas area. As was the case with the literature search of the project areas described above, these repositories were only briefly examined to document where information is located.

I. Fondo Obras Públicas

A. Serie Propiedad Pública (Public Works Repository - Public Property Series).

There is one box which deals with Peñuelas, Box #148. It includes land grant documents for the Peñuelas area, and some deal specifically with Tallaboa.

B. Serie obras Municipales (Municipal Works Series)

This series has the following information on Peñuelas.

Legajo 52, Caja 287

1846 - Topographic description of the town
1895 - population

1841 - 1880 - Casa del Rey
butcher shop and slaughterhouse
streets
cemetery
lots and "recursos de alzada"

C. Serie Caminos Vecimales (Neighborhood Road Series)

Legajo 52 Caja 1434; 1830-1928
Legajo 243 Caja 1574; 1936-1954
Legajo 244 Caja 1574
Legajo 327 Caja 1608; 1942-46
Legajo 328 Caja 1609; 1943 Tallaboa road
Legajo 442 Caja 1677; 1945 - Tallaboa road
Legajo 415 Caja 1700; 1950-54

II. Fondo Documentos Municipales (Municipal Documents Repository)

This repository has a preliminary inventory for Peñuelas, which includes 11 legal boxes, 2 square boxes and 5 packages of documents.

FIELDWORK AND RESULTS

Since the results of the archival research were not available prior to fieldwork, the survey strategy was of necessity opportunistic closely approximating the areas of potential impact as identified by Area Office personnel. The first area which was checked was the large field on the west bank of the Tallaboa just below the bridge on Route 127. The area east of the river has been developed into a picnic ground for the employees of the petrochemical complex. The area walked was covered with a heavy growth of grass and weeds and surface visibility was practically nil. The field was walked in search of unusual rises which might indicate scattered refuse heaps but none were identified. An area supporting a heavy growth of bamboo was suggestive of a possible site and was found to contain the remains of several structures associated with the sugar cane industry in the region.

The remains of concrete irrigation (?) ditches were evident as well as several foundations right on the bank of the Tallaboa. These features were photographed. No evidence of prehistoric activity was uncovered.

The second segment which was evaluated was the portion of the Rio Guayanés which forms the eastern boundary of the town of Petuelas. The river's channel was walked concentrating on the eastern bank which is relatively undeveloped. We entered the river at the point where route 386 crosses the river on the north part of town, paying close attention to the cut bank profiles. The profiles along the stream were typical of the Reilley gravelly loam series. Approximately 100 meters downstream from the bridge a number of ceramic fragments were found eroding out of the left bank about 40-50 centimeters below the surface. An attempt was made to find other cultural material by walking the adjacent field. The field was planted in pigeon peas and surface visibility was good, however, no other artifacts were found. This find may represent the northerly extension of the large occupation at the confluence of the Guayanés and the Tallaboa - the site of Caracoles (PE-1) which was destroyed by the construction of a baseball diamond. The ceramics are well made although undecorated. They probably date from the Ostiones period, if the quality of manufacture is any indication.

The last segment which was evaluated was the section of the Tallaboa eastward from the confluence with the Guayanés. Several fields were walked and a number of shovel test pits were placed in one of the overgrown fields.

The field which was shovel tested was mantled by a silty clay loam of the Toa series. Surface visibility was zero and the test pit was placed primarily to evaluate the nature of the soil. Some gravel was present in the test pit. An informant was found quarrying gravel along the bank of the river and he was questioned about Indian sites in the vicinity. He indicated that there was a cueva del indio (Indian cave site) at the edge of the field which we had just walked and pointed to its location, at the point of contact between the series of hills fringing the bottom lands and the

flood plain itself. An attempt was made to enter the cave, however, the vegetation was so dense that it was impossible to approach the entrance or even confirm its status as a cave without a machete.

RECOMMENDATIONS

Archeology

The left bank of the Rio Guayanés from the Route 127 bridge downstream to the first residence should be intensively surveyed if impact is anticipated. Sherds located may be indicative of cultural deposits in this section of the project. An attempt should be made to relate the recovered material to the site of Caracoles.

The areas between the petrochemicals complex and the town of Peñuelas were not surveyed. These areas, especially on the eastern side of the river, contain large stretches of San Anton soils. Vescelius' (n.d.) work in Puerto Rico and the Virgin Islands has shown a very good correlation between the location of early ceramic sites and soils of the San Anton series. Sites generally seem to be located on the margins of these soils adjacent to foothills. The landscape on the east side of the river offers just such an ideal combination. Therefore, if this stretch of the river will be subject to any impact it is recommended that an intensive survey of the areas be undertaken (Figure 14).

As is discussed below under Archive, the sugar cane industry flourished in the area during the nineteenth century. Remains of these haciendas and industrial complexes which may be within the impact areas could be eligible for the National Register of Historic Places and should be fully considered in the field survey. However, the archival recommendations for this aspect should be completed prior to the field survey so as to provide information on their location and extent. Particular attention should be paid to



FIGURE 14. Areas Recommended, Tallaboa.



FIGURE 14. Continued.

differences between cane agriculture in this area and that of Loiza. The variation in available moisture should have affected the nature of irrigation systems.

Archive

The most important result of the archival research of primary nineteenth century sources pertaining to the Peñuelas/Rio Tallaboa project area was the uncovering of a wealth of data concerning the irrigation of nineteenth century haciendas. As was enumerated above, a superficial reading of these documents revealed information concerning the names of the principal haciendas of the area, the location of these, the depiction of the roads that connected these haciendas with the town of Peñuelas and the barrio of Tallaboa, the acreage of some of the haciendas, the type of crop cultivated, the proprietor's name, the boundaries of the haciendas, the layout and plan of the haciendas, the relationship concerning the location of the haciendas with respect to the rivers, the importance of irrigation for adequate crop yields, the controversies between proprietors for the acquisition of water, the buying and selling of land, the engineering elements of the irrigation systems, etc.

Many research topics could be developed on the basis of this documentation. It could be used to reconstruct the history of land-use and settlement of the area, focusing on the nineteenth century plantation system. Most of the documents consulted date from the 1840's to the 1890's, and could serve as primary evidence for studying the development of these plantations in the Tallaboa area. Many anthropological, sociological, and historical studies of the plantation systems of the Caribbean area have been made and could serve as a form of comparison and as a source of research ideas for this type of work. Furthermore, with the maps available, predictions could be made concerning the location of the remains of these haciendas and survey strategies designed to locate these could be prepared. If the remains of these haciendas are located in the field, the documentary evidence available would become very useful in developing an adequate research design for further survey, testing, and/or data recovery at these sites.

Information is also available to study industrial aspects of the plantation system, namely the irrigation system practiced in the haciendas. Old irrigation channels can be traced, and engineering structures associated with the system (e.g. bridges and dams) can be studied. The documents available at the archives are basically requests for permits to irrigate plantation lands. The proposed irrigation project is spelled out, and plans indicating the spots along the river where water is to be taken, the location of channels, the construction of dams, or other water control structures are part of the document. Structures are drawn to scale, and estimates covering cost, materials, labor, and time of completion of the project are given.

The documentary evidence available in the water series of the Public Works Repository can be combined with the data available on land grants to complete the picture of the agricultural economy of the Tallaboa Valley during most of the nineteenth century. Study of the documents dealing with main roads, neighborhood roads and bridges could also contribute to this, especially when the importance of an adequate road network for the development of the sugar industry is taken into account.

Additional research into earlier documents pertaining to this area is also recommended. The sources listed earlier can serve as a starting point for this.

Integration of future survey efforts should be enhanced by the analysis currently being conducted by the Corps on the Rio Tallaboa basin. Prework conferences at the Area Office altered somewhat the area of concern to the field party. Originally, the project was limited to a system of levees as indicated in the Section 205 Reconnaissance Report (USACOE 1979). Subsequently, this project was selected as 1 of 8 nationwide to be input into the Corps Spatial Analysis Method as a pilot study. Thus, the study area became the total basin (Figure 13). The results of this overall environmental study should be useful in evaluating the area and the one archeological site found.

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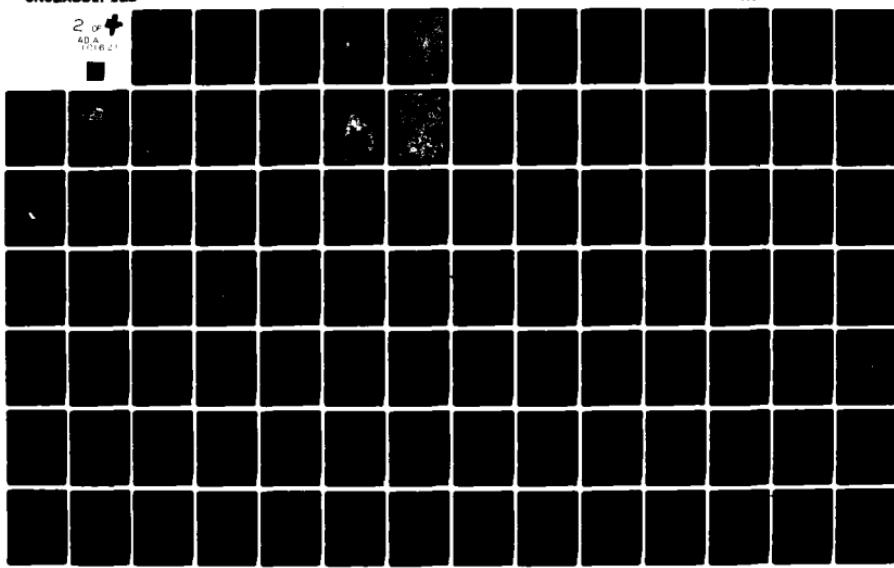
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It is anticipated, however, that the nature of impacts will remain the same. These are the construction of levees, borrow areas for this construction, relocation of structures and bridges, and construction staging areas.

RIO GUANAJIBO AT SABANA GRANDE

ENVIRONMENT

The general character of the environment in this project area is similar to that described for the Rio Tallaboa project area. The only major difference is the fact that the more northerly location of the Guanajibo places this area directly into the foothills of the Cordillera Central and in a more mesic climate. Only certain aspects of the geology and hydrology which differ from the general character already described in the Tallaboa section will be highlighted.

Geology

One of the major geologic differences between this area and the Tallaboa is the wide expanse of lowland which characterizes the Lajas Valley. Another interesting aspect of the geologic history of the area pertains to the Guanajibo river itself.

The history of the Guanajibo is of special interest, due to its capture of the streams to the east of San German. These streams formerly flowed south through the Uauco-Boqueron Valley (Lajas) to Guanica Bay. The original Guanajibo, which drained westward from San German, had a shorter course to the sea than the streams of the Yauco-Boqueron valley. As a consequence, it pushed back its headwaters, which were then west of San German to a point east of the city. The Cain and Flores, with their branches were then following a longer southerly route and developing the Yauco-Boqueron lowland. With the eastward advance of the Guanajibo, this southward drainage was captured and diverted to the west. The water gaps in the hills southeast of San German strongly support this conclusion. Stream gravels are present in some of these gaps.

(Mitchell, 1926:237)

Soils

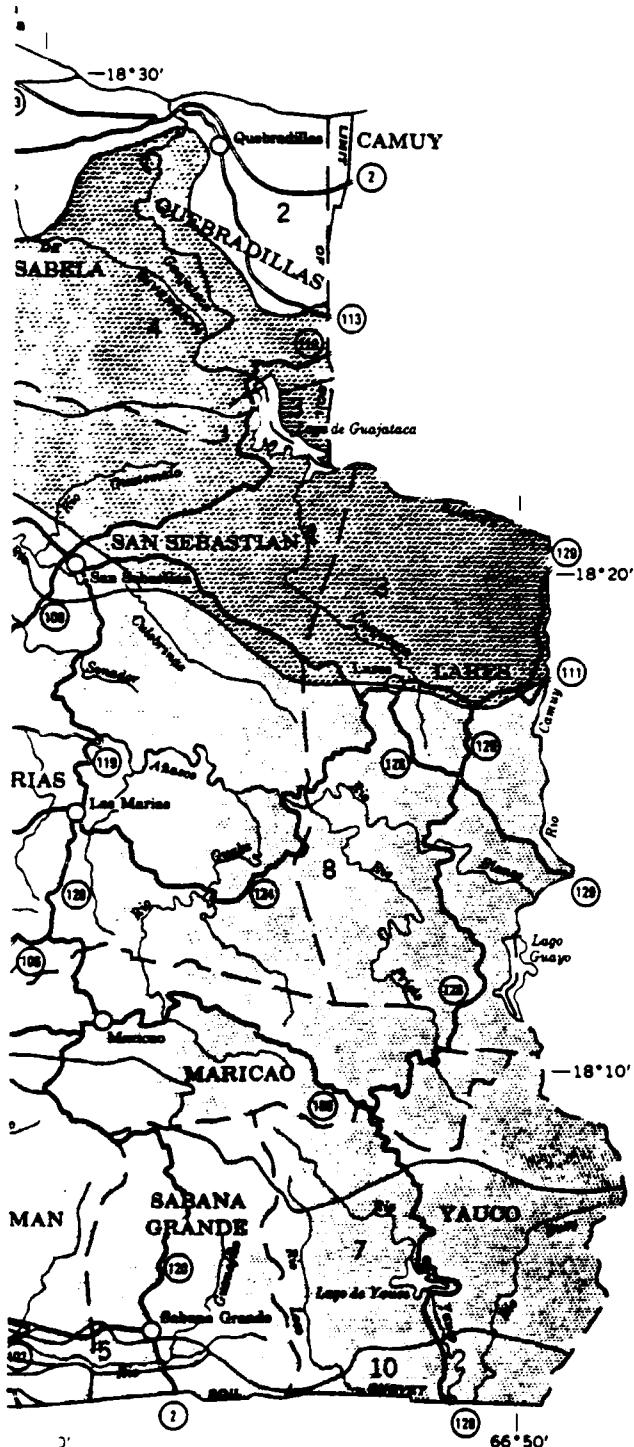
The soils in the project area can be generalized into two types as shown in Figure 12. The loamy soils of the Coloso-Toa association which are associated with the Guanajibo floodplain and the soils of the volcanic rock uplands of the Caguabo-Mucara association. The latter are described as 'slightly leached, loamy and clayey, sticky and plastic soils underlain by hard or weathered rock at a depth of less than 30 inches, in a humid climate.' (SCS, 1975.) The detailed mosaic showing the distribution of the various series is shown in Figure 16. Excluding the upland soils, this mosaic shows that in the area of immediate concern to this project two series predominate. These are the tongues of Toa silty clay loam which are scattered about in situations somewhat distant from the present river and the Reilley gravelly loam which dominate the immediate surrounding of the Guanajibo. A small segment of Dique silt loam is also present in the project area and this probably represents more recent levee deposits.

Vegetation

As has been indicated above, the only difference in the vegetation in this project area is the more mesic character which results from the more inland location. However, from the perspective of prehistory the lagoons, swamps, and marshes, which dotted the Lajas valley prior to modern drainage, must have been a significant factor in the prehistoric subsistence patterns.

PREHISTORIC BACKGROUND

The Guanajibo drainage is incorporated as part of Rouse's western archeological area. Rouse makes the following comments with regard to this area:



SOIL ASSOCIATIONS

ASSOCIATIONS OF THE COASTAL PLAINS

- 1** Belucos-Jabos association: Strongly leached soils that have a tight, dominantly clayey subsoil
- 2** Coto-Aceitunas association: Slightly leached and strongly leached porous soils that are dominantly clayey throughout

ASSOCIATIONS OF THE LIMESTONE UPLANDS

- 3** Colinas-Soller association: Shallow and moderately deep, porous, loamy and clayey soils and numerous limestone outcrops

- 4** Limestone outcrop-San Sebastian association: Limestone outcrops and moderately deep, steep and very steep, porous, gravelly, clayey soils

ASSOCIATIONS OF THE FLOOD PLAINS

- 5** Coloso-Tao association: Nearly level, porous soils that are loamy throughout

ASSOCIATIONS OF THE VOLCANIC ROCK UPLANDS

- 6** Voladora-Moca association: Strongly leached, clayey, slightly sticky and plastic soils underlain by rock at a depth of more than 60 inches; in a very humid climate

- 7** Caguabo-Mucara association: Slightly leached, loamy and clayey, sticky and plastic soils underlain by hard or weathered rock at a depth of less than 30 inches; in a humid climate

- 8** Consumo-Humatas association: Strongly leached, clayey, sticky and plastic soils underlain by thick layers of weathered rock; in a very humid climate

- 9** Nipe-Rosario association: Very strongly leached, clayey, nonsticky and plastic soils underlain by hard or weathered rock at a depth of more than 20 inches; in a very humid climate

- 10** Descalabrada association: Slightly leached soils that have a clayey subsoil and that are underlain by hard rock at a depth of less than 20 inches; in a semiarid climate

FIGURE 15. Soil Associations near Sabana Grande.



FIGURE 16. Soil Mosaic, Sabana Grande.

Both on the south and on the west the region is favored by a series of small, well protected bays, which must have provided shelter for the aborigines while fishing. Even without these bays, however, the coast is the most sheltered on the island, for the prevailing northeastern winds do not reach it. Thus, conditions must have been ideal for the Indians, and in fact more sites have been located in this district than in any other comparable part of the island, with the possible exception of the district around Santa Isabel and Salinas on the south coast. (Rouse, 1952:369.)

The site of Las Cucharas, which is located just outside the municipality of Lajas is perhaps one of the most significant sites on the island. It is one of the largest (if not the largest) shell heap on the island, with a diameter of nearly 200 meters and a maximum depth of over two meters. Culturally, it spans the period between Early Cuevas to Late Ostiones with a possible hiatus during early Ostiones. According to Rouse, the site contains the sharpest contrast between stratigraphic levels, i.e. between the Cuevas and Ostiones material of any site found on the island. Another interesting aspect of the prehistory of the area is the absence of late prehistoric sites, at least as of the time when Rouse did his work. Of the eight sites which Rouse excavated none had late prehistoric ceramics (Chicoid) with the exception of scattered sherds of the Capa style. Rouse further suggests that the southern part of the west coast may have been largely depopulated at the time of historic contact.

Immediately to the west of Sabana Grande in the village of Minillas halfway between Sabana Grande and San German is the site of Minillas. The site is a small shell heap and lies in the valley of the Guanajibo. Rouse did not excavate this site but he did evaluate the collections which had been made by Lothrop in his excavations in 1915. Interestingly enough Lothrop's collections contained about equal amounts of both Ostiones and Capa ceramics. Because of this Rouse concluded that the site represented a very late Ostiones occupation in transition, at a time when Capa was beginning to come into prominence.

Other sites were reported by Gonzalez to be in the vicinity of Machuchal to the south of town. Another site was reported in the vicinity of the Capilla del Pozo de la Virgen, a religious shrine located on route 364 to the northeast of town.

A search of Rouse's field notes yielded only six references to sites in the vicinity of the Sabana Grande project area. These were listed as follows:

1. Sabana Grande #1 - Ball court; Barrio Tabonuco; Hacienda Victoria of Joaquin Onis.
2. Sabana Grande - Cave, shell heap; Barrio Rayo; Finca of Manolo Per alata.
3. Sabana Grande - shell heap just east of town at K30 on the Ponce road; did not find (Lothrop reference).
4. Sabana Grande cave - La Carmelita; inquired but not found;
5. Sabana Grande - Cueva Le Maquina; at K36 on the Ponce road; surveyed 8/13/38; nothing found.
6. Sabana Grande - Cueva Barreto (?); surveyed 8/13/38; nothing found.

Juan Gonzalez of the Sociedad Guaynia indicated that a map showing the distribution of sites in the Sabana Grande U.S.G.S. quadrangle was in preparation but a copy was not available because it was not yet completed.

HISTORIC BACKGROUND

Local History:

Sabana Grande is located in southeast Puerto Rico in a small inland valley drained by the Guanajibo, Flores and Cruces Rivers. It is bounded to the north by Maricao, to the south by Guanica, to the west by San German and to the east by Yauco.

Sabana Grande was originally a barrio (borough) of San German and was known as Sabana Grande Arriba. Its church, called "Iglesia de San Isidro y Santa Maria de la Cabeze," was erected in 1808. (Irrizarry, 1954.)

Sabana Grande Arriba officially became the town of San Isidro de Sabana Grande on December 5, 1813, with jurisdiction over a 60-acre area. Don Pedro de Acosta was the founder and first mayor of the town, assuming office in 1814 (Irrizarry, 1956).

As most XIXth century towns on the island, Sabana Grandes' main economic activity was agriculture. Towards the middle of the nineteenth century (1847) the most important crops were rice, maize, and coffee. Three sugar haciendas were in operation, and animal husbandry was also practiced (Descripción topográfica del Pueblo de Sabana Grande: 1847). The town consisted of 8 streets with 48 houses and 62 bahios, as well as commercial structures and "ventorrillos" (Descripción topográfica de Sabana Grande: 1847). Communication with other towns was provided by a road that went from San German to Yauco and passed through Sabana Grande, plus a few neighborhood roads which provided contact with the barrios.

Towards the end of the nineteenth century there were three sugar cane haciendas still in operation: The Carmelita and San Francisco haciendas, established in 1872, and the San Felipe hacienda, founded in 1880 (La Gran Enciclopedia de P.R., 1976: 282). One of these, the San Francisco hacienda, is still standing, though not in operation. It is located on the road from Sabana Grande to Machuchal * and can be visited (Irrizarry; personal communication). Information concerning this nineteenth century hacienda is available in the General Archives of P.R. and will be discussed below.

Cane cultivation is still important, and minor crops such as fruits and vegetables are also cultivated. Some local industries have been established in the municipality.

Background and Literature Search

Specific information concerning municipal documents, irrigation permits, nineteenth century haciendas, roads, maps, etc. was discovered in the General

*Machuchal is a barrio of Sabana Grande.

Archives in San Juan. A discussion of the data compiled from these sources is presented below. It is not exhaustive, since not all relevant repositories were checked and some were examined more thoroughly than others.

I. Fondo de Obras Públicas (Public Works Repository).

A. Serie - Aguas (Water Series)

This series proved to be the most useful of all the ones consulted at the Archives for all of the project areas discussed in this report. This series contains documents concerning the diversion of water from rivers for the purposes of irrigation or channelization. Transactions and requests for permits, studies, maps and plans of how the water is to be diverted or for what purposes, grievances, etc., are documented here. This provides an important source of information concerning nineteenth century haciendas, since many owners requested permission to use the river's water for irrigation purposes and included plans and maps of their property.

The following information was compiled from this source.
(O.P. Serie Aguas, Subserie Riego.)

(1) Legajo 40, caja 416

File concerning Don Francisco Boullero's (?) application for establishing an hydraulic motor in the Rio Grande de Sabana Grande.

(2) Legajo 171a, caja 457.

(a) File concerning the utilization of the waters of the Sabana Grande River and stream by the Rodriguez family for irrigation of their Hacienda San Francisco, 1879.

(b) File concerning the Rodriguez request to divert 13 liters/second of water from the Sabana Grande river and stream for irrigation of their hacienda, 1882 - 1884.

It includes an 1883 plan of the San Francisco Hacienda indicating the projected irrigation ditches, the road, and the locations along the river and stream from which water is to be taken.

(c) File concerning the Rodriguez Society's request for utilization of waters from the Sabana Grande river for irrigation of the San Francisco Hacienda. It includes engineering plans of the structures, plus a general irrigation plan.

(3) Legajo 475, caja 563 (Sub-serie, canalizaciones).

Includes a file concerning the channelization of the Los Muertos stream, Sabana Grande, 1946.

B. Serie Propiedad Pública (Public Property Series).

This series has not been indexed. Information is arranged alphabetically by municipality. This series consists mainly of land grant documents. There are 3 boxes which contain Sabana Grande material and are numbered 166, 167, and 168. These were not examined individually, but a general examination indicates that they contain data on town plans, censuses, etc., which should be examined in any further work.

C. Serie-Obras Municipales - (Municipal Works Series).

This series has the following information on Sabana Grande. This information was taken from the available index. The individual documents were not examined:

(1) Legajo 59, caja 310.

1847 - Topographic description of Sabana Grande
1841 - Boundaries between Sabana Grande and San German
1853 - Town news
1878 - Boundaries of the town "egidos" (land plots)
Casa del Rey (King's House (?))

(2) Legajo 59-a, caja 310

plots
public clock

(3) Legajo 59-B, caja 310

Butchershop
Lighting
Cemetery

(4) Legajo 59-C, caja 311

Various matters
Correspondence from the Mayor's Office (Alcaldia)
Public market

(5) Legajo 59-d, caja 311

Municipal hospital

D. Serie Caminos Vecinales - (Neighborhood roads series)

The neighborhood roads inventory is also arranged by town, and the documents relevant to Sabana Grande are located in:

- (1) Legajo 59, caja 1449 - 1841-1925
- (2) Legajo 166, caja 1540 - 1934,1937
- (3) Legajo 365, caja 1633 - 1946
- (4) Legajo 366, caja 1634 - 1947

II. Fondo Documentos Municipales - (Municipal Documents Repository).

These documents used to be kept in each town's city hall (alcaldia), but have been transferred to the General Archives in San Juan. Many of these are inaccessible at present for lack of inventory. The Sabana Grande documents are accessible without a guide, which makes them time consuming to look through. There are 38 legal boxes, 11 square boxes, and 10 packages of documents on Sabana Grande.

III. Fondo Departamento de Hacienda - (Department of the Treasury Repository).

A. Serie Tasación - (Land Appraisal Series)

This series contains aerial photographs for land appraisal purposes, and includes some for Sabana Grande. These are located in Box 15 and might be useful for future reference.

FIELDWORK AND RESULTS

Because of the limited amount of information available on sites in this area, as well as the nature of the project, the fieldwork was confined to areas immediately adjacent to the river. The entire segment from where route 2 crosses the river north to route 364 was traversed. The right bank

of the stream was walked and a number of fields were shovel tested, especially in the area designated as a possible site for a retention basin, immediately adjacent to Route 2. It was evident from walking along the riverbed that the sides of the channel had been heavily modified by the construction of an embankment, presumably designed to offer some limited flood protection. The embankment had been constructed simply by dumping material from the streambed. An informant indicated that the 'levee' or embankment had been constructed after Hurricane Eloise. A number of fields along the eastern bank of the river were under cultivation but were not surveyed because of limited access.

An interview with the town historian yielded the only reference to Indian relics. The informant indicated that when he was young he used to collect Indian artifacts in the area which is to the east of the original town now known as San Isidro. This is the development which is adjacent to the river. The area has been developed in the last 30 years as can be seen in a comparison of the 1949 and 1966 topographic maps (Figures 17 and 18).

This terrace extends down to the vicinity of the proposed retention basin. Shovel holes placed on the western side of the terrace, in the powerline area, indicated a sandy loam. Gravel encountered at 60cm may confirm its mapped status as Reilly gravelly loam (Figure 16). Closer to the basin, however, is a large pocket of Toa silty clam loam (Figure 16). This could be the location of Rouse's Km30 archeological site.

RECOMMENDATIONS

Archeology

Since the only areas that were slighted during the reconnaissance survey were the fields on the left bank of the river, it is recommended that once a better definition of project alternatives is obtained the segments which will be potentially subject to impact be intensively surveyed. The areas at the base of the foothills fringing the Toa soils would be prime candidates for containing prehistoric sites.



FIGURE 17. 1949 Sabana Grande Topographic Map.

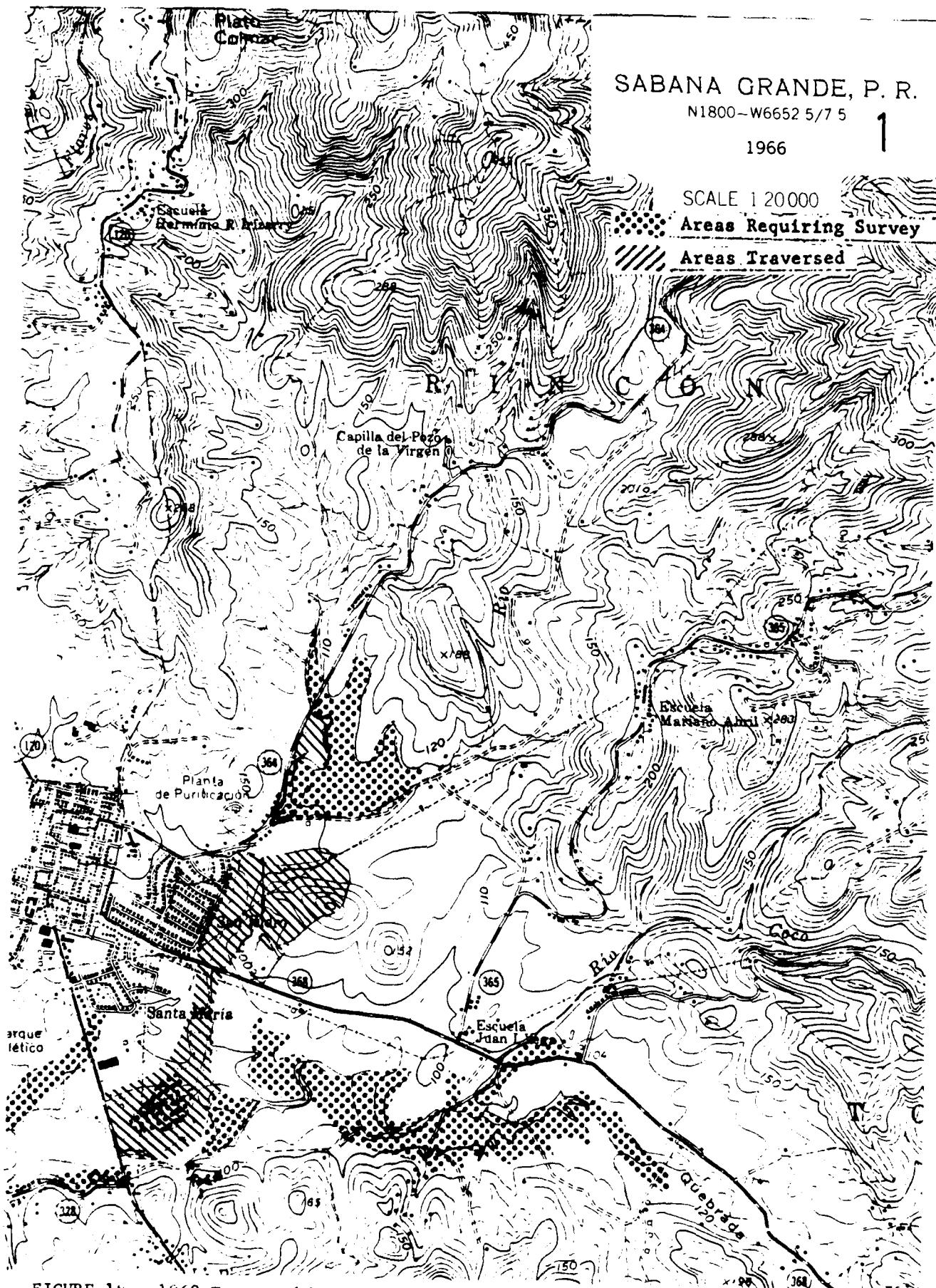


FIGURE 18. 1969 Topographic Map of Sabana Grande.

The impact area of the retention basin should be systematically tested with either standard test pits or backhoe trenches for site detection. If a site is located, sufficient information should be gathered to allow a determination of eligibility for the National Register of Historic Places.

Archival

Archival research carried out during this reconnaissance has indicated several haciendas and other complexes associated with agriculture within or in proximity to the project area. Information recovered from the additional archival research recommended below should be utilized in a cultural resources survey to locate and assess these sites for their eligibility for the National Register of Historic Places.

The literature search carried out for the purposes of this reconnaissance has surfaced various sources of nineteenth and twentieth century documents pertaining to irrigation, roads, municipal works, aerial photographs, etc., which should be more thoroughly investigated in future work. The information presented above should provide a good starting point for more intensive historical research in the Sabana Grande/Rio Guanajibo area. The presence of documents on the nineteenth century haciendas offers excellent opportunity for reconstructing the plantation system at this time.

Information concerning the location of these haciendas, their owners, the acreage involved, the kinds of crops planted, the number of structures, the road system, etc., can be extracted from a careful reading of these documents. This might provide clues to the location of these on the ground. Furthermore, the documents relating to the Hacienda San Francisco can also be used to interpret the present-day ruins of that Hacienda.

Information concerning the Sabana Grande/Rio Guanajibo area prior to the establishment of the town must be collected by focusing on the town of San German, of which it used to form part. General sources for the early historic period should also be scrutinized for any mention of that area.

RIO FAJARDO

ENVIRONMENT

This project area is located in the northern section of the east coast. This area is relatively rugged and represents the foothills of the Sierra de Luquillo which extend almost down to the coast at this point. The major topographic low in the area is the floodplain of the Rio Fajardo.

Geology

Units of major geologic importance are the upper Cretaceous shales which make up most of the foothills which in some instances stretch from the main Luquillo massif to the coast.

Soils and Hydrology

The generalized distribution of soils in the east coast area is shown in Figure 19. Two major units are discernible in the project area - the soils of the Rio Fajardo floodplain which are part of the Coloso-Toa-Bajura association which are generally deep, moderately well drained to poorly drained. The second group are the soils on the volcanic uplands of the Caguabo-Mucara-Naranjito association.

The detailed mosaic is shown in Figure 20. In the project area the above division is recognized as follows - the hills which will ultimately form the anchor for the dam are part of the Naranjito series. They are formed in moderately fine textured residuum weathered from volcanic rocks. (SCS, 1977). The lowlands fringing the Rio Fajardo and its tributaries are rated either as cobblely alluvial land (Cn), the related Reilley series soils which are generally underlain by sand and gravel, and finally the large triangular bottom which is actually an island and which will presumably be the site of the lake, is rated as wet Alluvial land (Wa), which is of generally limited utility.

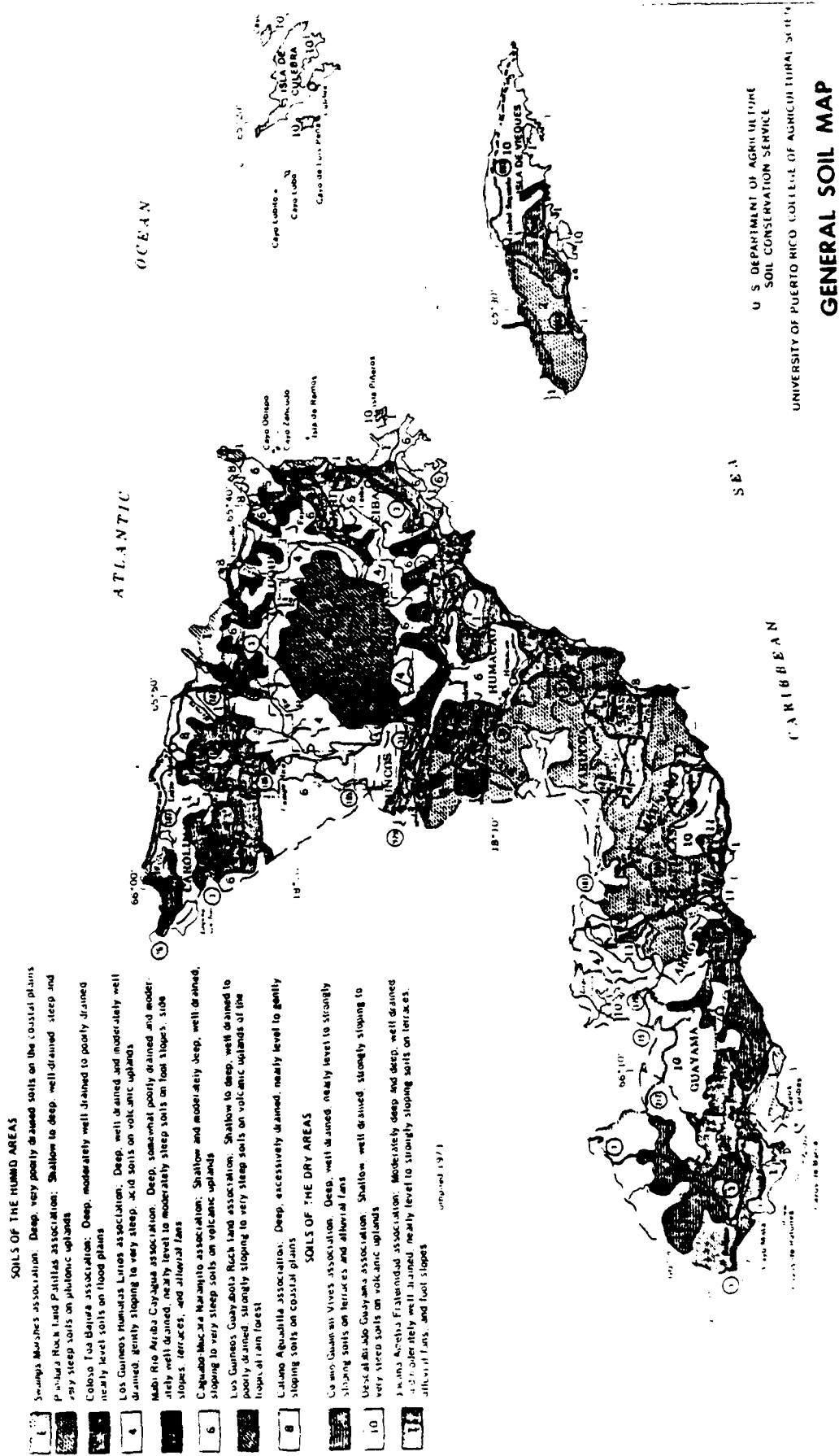


Figure 19. Soils of the East Coast.



Figure 20. Soils Mosaic of the Fajardo Area.

Vegetation

The vegetation in the area is of a generally mesic character.

PREHISTORIC BACKGROUND

The area of the east coast of Puerto Rico is probably the least known archeologically of all the regions in the island. In 1952 Rouse stated that "from the archeological standpoint, the east-coast area has been badly neglected." (Rouse, 1952:548.) With the exception of Vieques Island, which is considered to be culturally a part of this region, the same statement can be made today. The only sites of any consequence that Rouse dug in this area are located around Ensenada Honda. One site contained primarily Elenoid material while the other site was considered to be preceramic.

An interesting aspect of the east coast area is the apparent abundance of petroglyphs. Numerous references in the literature attest to this from the earlier work of Pinart (1893) to the more recent work of amateurs in the area. The following citation is to be found in Fewkes (1907):

Some of the most instructive river pictographs in Puerto Rico are found at the eastern end of the island. There are many near Fajardo, and others are on the Rio Blanco not far from Naguabo.

Unfortunately, Fewkes does not illustrate any of these. Rouse illustrated a number of pictographs/petroglyphs which he found at Ensenada Honda (Rouse 1952). Recent work by the Arqueologos Aficionados del Este under the direction of Paquito Melendez have also turned up a number of major petroglyph finds as indicated by the copies of a newspaper article which was kindly provided by Mr. Melendez during our visit to the project area (Carrion 1979: 1-27). These petroglyphs are of the same general character as those illustrated by Rouse for Ensenada Honda. The newspaper report also

alludes to other finds, and in conversations with Mr. Melendez other site finds were reported by him along the Rio Fajardo. Unfortunately, no definite site locations were obtained.

HISTORIC BACKGROUND

Local History

The town of Fajardo is located on the eastern coast of Puerto Rico, in an alluvial plain drained by the Fajardo river. It was initially populated during the seventeenth century, being one of the first east coast locations to be settled. As was discussed in other history sections of this report, contraband with the English and French was widespread during this time and was an important economic activity in the Fajardo area.

It was not until the last third of the eighteenth century that the settlement was officially established as the town of Fajardo. There is some controversy concerning the exact date, but 1772 or 1774 are the two most probable dates given (La Gran Enciclopedia de P.R. 1976, Vol. 13). Nevertheless, we know that by 1775 Fajardo was officially a separate municipality because it is stated as such in the "Informe del Cabildo de San Juan al Rey" (BHPR, Vol. 1, 1914).

During the early part of the nineteenth century, Fajardo and surrounding areas under its jurisdiction were frequently attacked by English and French corsairs which sailed from the Lesser Antilles towards the east coast of Puerto Rico. Historical sources indicate that this area was attacked in January 1817, January 1820, and June 1823 (Descripcion Topografica de Fajardo, 1847:117). Fajardo was again attacked in 1824 by American Commodore Porter. A small military outpost was established in the town both as a means of controlling illicit trade (Alegria 1975:17) and of protecting the population from attacks by foreign vessels.

With respect to the nature of the town itself, some historical descriptions are available. In 1776, Fray Inigo Abbad y Lasierra (1959:109) described Fajardo as a modern town consisting of 9 houses and a church, with the rest of the population (which numbered 1202 persons) inhabiting the river valley. He mentions the breeding of cattle and mules, plus the cultivation of coffee, cotton, plantains, sugar cane, beans, sweet potatoes and squash as the main economic activities of the population.

Another view of Fajardo can be gleaned from the sketches made by the French naturalist Angusto Plee during his visit to Puerto Rico from 1821 to 1823. One of his sketches shows the town in relation to the coast and port of Fajardo with a series of huts or bahios lining the coast (Alegria 1975: 15, Fig. 23). The other one (Fig. 26) shows Fajardo in relation to the mountains that form the eastern end of the Sierra de Luquillo. The church is clearly visible in this sketch, as well as a series of one and two-story dwellings (Alegria 1975: 17).

A more detailed description of Fajardo is available in an 1847 document entitled "Descripcion topografica del pueblo de Fajardo," available in the General Archives Building in San Juan (AGPR). This document describes the course of the Fajardo river:

The river of Fajardo flows by the south side of town, originates in the west side, about two and a half "leguas" from town. Its source is the same of the Rio de los Mameyes of the Lucillo jurisdiction, at the top of the mountain and also part of the flowing waters from the land of this same name. Both rivers meet at the Los Dos Brazos junction (Two Arm Junction) within the limits of the town of Fajardo from where the river runs two miles towards the southeast, then bends to the east for half a "legua" and zig-zagging through the plains to the east goes by the south side of town at a distance of 625 varas bending then to the east until it reaches the sea.
(Translation by Ana Borgamy)

This document mentions the presence of gold nuggets in the river, which is consistent with a 1582 source describing the Fajardo river as very rich in gold (Melgarejo 1582 in BHPR, Vol. I, 1914:83).

The major streams that drain the Fajardo River are also mentioned in this 1847 source. The streams (quebradas) named Vueltas Naranjo, Florencio, Penones and Luis are the most important (p. 113-114). Lagoons are also mentioned by name (p. 114).

At the time this document was written, 8 sugar ingenios had been established within the valley. There were also many small properties where fruit trees were grown, while the land closest to the Luquillo Mountain chain was utilized mainly as pasture for cattle.

The 1847 document also lists the 11 barrios that comprise the municipality of Fajardo (p. 115). With respect to the layout of the town, it was divided into 3 sections with 175 structures, a considerable increase over the 9 houses mentioned in Fray Inigo Abbad's 1776 account. These structures formed 11 blocks and 8 streets, 3 running north-south and 5 running east-west, in the usual Spanish fashion (p. 115). Information pertaining to specific buildings is also available in this report. The Parish Church was constructed in 1827, the Casa del Rey in 1806, the butcher shop in 1838, the custom office in 1826, and a small military battery established in 1809 and expanded in 1838 and 1842 (p. 115).

The road network during the middle 1800's consisted of 3 main roads: One extended east toward the port, one north toward Luquillo, and one south toward Ceiba (1847: p.116).

As was true of most coastal towns in Puerto Rico, the growing of sugar cane was one of the most important agricultural activities during the second half of the nineteenth century. This continued to be the case in the twentieth century, with the similar pattern of the establishment of sugar centrales occurring in Fajardo as elsewhere around the island.

At present, cane production continues to be the principal agricultural activity in Fajardo. Besides agriculture, people are employed in the dairy farm industry, construction, factories, government service and fishing.

The background search of primary sources at the General Archives in San Juan produced limited results, at least in comparison with areas such as Loiza or Tallaboa. They are discussed below.

I. Fondo Obras Publicas - Public Works Repository.

A. Serie Aguas - (Water Series).

Only one document dealing specifically with Fajardo was located.

Legajo 243-A Caja 472. This document deals with a project to channelize the Fajardo "Cano." It is dated 1927 and includes a detailed plan of the project.

B. Serie Propiedad Publica - Public Property Series.

This unindexed series includes 3 boxes labeled #65, 66, and 67, which contain nineteenth century land grant documents of as early as 1802.

C. Serie Obras Municipales - Municipal Work Series.

The following is an inventory of the information available:

Legajo 25, Ira parte, Caja 228

File Year

1	1847	Topographic description
2	1847	Description of the "Cuarteles," streets, blocks, and number of houses in the town
4	1853	Imperfection of the town plan (map)

"Solares y recursos de alzada"

5 1834
6 1849
7 1876
8 1884
9 1926

Casa del Rey

9 1844
10 1849
11 1858
12 1858
13 1861

etc.

Legajo 25 - 2da parte

<u>File</u>	<u>Year</u>	
19	1857	Butchershop, market place, slaughterhouse

Plus:

Legajo 25a	Caja 229
Legajo 25b	Caja 230
Legajo 25c, e	Caja 232 Market Place
Legajo 25d	Caja 231 City Hall
Legajo 25f	Caja 232 plaza

D. Serie Caminos Vecinales - Neighborhood Roads Series.

The following is an inventory of the information available:

Legajo 25	Cajas 1405, 1406	1843-1928
Legajo 217	Caja 1565	1938-39
Legajo 285	Caja 1593	1940
Legajo 480	Caja 1693	1945

II. Fondo Documentos Municipales: (Municipal Documents Repository).

The Fajardo municipal documents at the General Archives are available for inspection, but no guide is provided. These include 114 legal boxes and the equivalent of 423 legal boxes in packages and books.

For obvious reasons, anyone interested in studying the municipal history of Fajardo would require a lot of time to even superficially examine these documents.

III. Fondo del Departamento de Hacienda (Treasury Department Repository).

A. Serie Tasacion (Land Appraisal Series).

There is a set of 80 aerial photographs of the Fajardo area, the majority taken in March 1936, located in Box 7 of this series.*

FIELDWORK AND RESULTS

The fieldwork in the project area consisted of walkovers both in the hills which will anchor the dam as well as the bottoms which will be inundated by the lake (Figure 21). A number of roads had been cleared through the dense vegetation of the hills by Corps of Engineers crews responsible for carrying out borings in the project area. These roads were walked and visibility was generally excellent. A number of possible artifacts were encountered scattered about. These were primarily pieces of stone which seemed to have indication of working. However, upon close examination none of the pieces could be said to have been definitely manufactured, or modified by man.

*Fondo - Depto de Hacienda

Tarea - 74-39

Mapas de Tasacion, Letras D-F Caja 7 AGPR

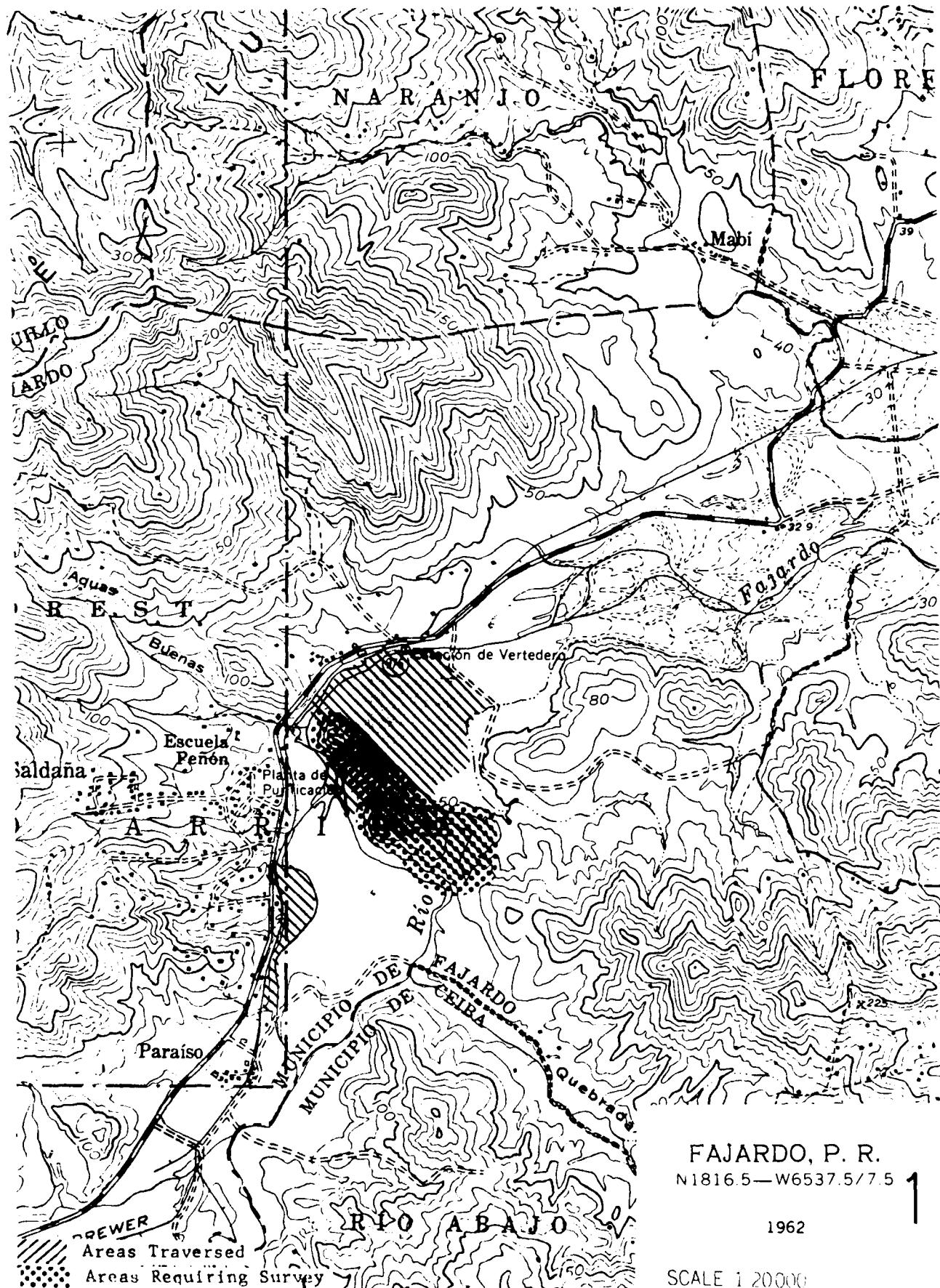


Figure 21. Areas Traversed, Fajardo

The lowlands along the river were spot checked and most of the cut bank profiles examined confirmed the gravelly nature of the underlying deposits, and the generally waterlogged character of the alluvial bottom which comprises most of the proposed lake area. The whole area has probably seen considerable reworking of the material since the river seems to be oscillating back and forth throughout the lowland triangle.

RECOMMENDATIONS

Archeology

Due to the reworked nature of flood plain deposits, intensive survey should only be necessary on the hills within the project area since there is the possibility that rockshelters may be present. Certainly their location in proximity to the Rio Fajardo would make them prime candidates for occupation as well as their commanding position in the landscape providing an excellent panorama of the surrounding lowlands.

Future survey should be undertaken in cooperation with the local amateur groups headed by Mr. Melendez since they are sources of Rio Fajardo site locations.

Near the project area several abandoned cane railroad cars were noted on an old narrow gauge track. Several railroad bridges over small creeks were also noted. These and other aspects of the areas past agricultural technology should be considered in a cultural resources survey.

The as yet unspecified terrestrial and submerged route of the water pipeline will require a survey. An underwater remote sensing survey utilizing a proton precession magnetometer, side scan sonar, shallow seismic profiler and positioning system to locate and record magnetic anomalies that may represent historically significant shipwrecks will be required for the underwater segment of the pipeline. This survey should be conducted under the supervision of a qualified marine survey archeologist and could be

coordinated with other geophysical/hazard surveys when feasible alternate routes for the pipeline are selected.

Archive

The archival research carried out for this project did not result in specific data concerning the cultural resources of Fajardo. An examination of the Public Works Repository's water series documents provided limited information. Other sources, e.g., public property, municipal works, neighborhood roads and municipal documents were inventoried. These sources, especially the ones dealing with public property and municipal documents, offer good potential for providing specific data on the history and development of the Fajardo municipality during the nineteenth century.

Recommendations for additional archival work on the Fajardo area are warranted. This work should begin by an examination of the documents inventoried above and should then proceed to check other archival sources that are not inventoried here but that are part of the General Archives collection. Information on road networks, town structures, municipal territory, barrios, municipal legislation and policies, finance, land grants, etc., can be obtained from these sources.

The early history of Fajardo should also be researched, since this was not accomplished in this project. Sources listed above should serve as guidelines for this investigation. One possible focus for future research could be the role of the Fajardo port and surroundings in the development of the town. During the early sixteenth century, the eastern coast of Puerto Rico was frequently raided by Indians coming from Vieques and the Virgin Islands. Fajardo was also one of the points of contact for illicit trade with the French and English, and was also frequently attacked by foreign corsairs. Information concerning these events should be available in early documents.

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APPENDIX A

PUERTO RICO PREHISTORY

An Outline

By

VICTOR A. CARBONE

PUERTO RICO PREHISTORY
AN OUTLINE

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PUERTO RICAN PREHISTORY
AN OUTLINE

INTRODUCTION

Historical Background

The history of Puerto Rican archeology can be easily reviewed within the developmental context established by Wiley and Sabloff (1974) for American archeology as a whole. In their historical review they established five periods of development, but for the purposes of this study their scheme has been contracted by eliminating the initial speculative period. The periods as they apply to Puerto Rican archeology are as follows:

- (1) Classificatory-Descriptive Period - 1880 - 1920
- (2) Classificatory-Historical Period I - 1920 - 1940
- (3) Classificatory-Historical Period II - 1940 -1960
- (4) Explanatory Period - 1960 - 1980

As defined by Wiley and Sabloff the Classificatory - Descriptive period (1880-1920) was characterized primarily by a 'focus on the description (of the more elaborate) archeological materials, and rudimentary classification of these.' (Wiley and Sabloff 1974:42). In the late 19th century the work of Pinart (1893), entitled Note sur les petroglyphs et antiquites des Grandes et Petites Antilles, and that of Agustin Stahl (1889), Los Indios Borinquenos, estudios etnograficos both stand out. According to Rouse (1952) both of these individuals visited a number of sites on the island in the 1880's. In the 1890's Cayetano Coll y Toste is reported to have also visited sites on the north coast and undoubtedly the results of these investigations were incorporated in his now classic Prehistoria de Puerto Rico (1907) which probably represents the first comprehensive "modern" attempt in Spanish to present the details of aboriginal island life. The first twenty years of the 20th century witnessed a tremendous flurry of archeological activity under the sponsorship of a number of major American institutions. Jesse Walter Fewkes was commissioned in 1902 by the Director of the Bureau of American Ethnology to carry out research on the prehistory of the West Indies and much of his work was focused on Puerto Rico. Fewkes

was one of the earliest researchers to apply a comprehensive approach to the gathering of data on West Indian prehistory by utilizing historical, ethnological and archeological sources and the success of his endeavors is embodied in the volume published in 1907 entitled The aborigines of Porto Rico and Neighboring Islands which still stands as one of the most useful references on late prehistoric cultures of Puerto Rico. Following Fewkes, major incursions into Puerto Rico by American researchers were fostered by the creation of the Scientific Survey of Porto Rico and the Virgin Islands under the joint auspices of the New York Academy of Sciences, the Department of Agriculture and Commerce of Puerto Rico and the University of Puerto Rico in 1913. Dr. Franz Boas of Columbia University was placed in charge of the Anthropological section of the survey and beginning in 1914 a number of researchers were dispatched to the island to study the various aspects of island language, culture and archeology. Archeological investigations were undertaken by R. T. Aitken (1917-1918), H. K. Haeberlin (1917) and J. Alden Mason, the latter concentrating his efforts on one of the largest ceremonial sites ever found on the island, the site of Capa in Utuado (Mason, 1917, 1941). Herbert J. Spinden also conducted excavations in the southwestern coast of the island at the site of Ostiones near Cabo Rojo under the auspices of the New York Academy of Sciences. This work was never published and the collections are now located at the American Museum of Natural History. Other investigators who actively pursued the archeology of the island included Samuel K. Lothrop who conducted a survey of the island in 1915 and 1916, identifying over 100 sites and carrying out excavations at five of them. Unfortunately the work was never published although copies of the manuscripts have been circulated. The collections now reside at the Harvard Peabody Museum. Finally Theodore DeBooy, better known for his work in the Virgin Islands and the Dominican Republic (1915, 1919a, 1919b) also carried out investigations in Puerto Rico under the auspices of the Museum of the American Indian, Heye Foundation, New York, but this work was also never published.

A number of illustrious Puerto Ricans were also actively pursuing archeological investigations on the island during this time period, among them Drs. J. L. Montalvo Guenard (1933) and Adolfo de Hostos (1919, 1938, 1941).

Most of the work that was carried out during this period is primarily concerned with a reconstruction of the immediate ethnographic past of the late prehistoric cultures of Puerto Rico and neighboring islands. A number of the investigators including Fewkes and De Hostos, attempted to draw chronological inferences from the limited stratigraphical investigations that they carried out. However, these were never elucidated in detail and it was not until the next period and the advent of the so called stratigraphic revolution in American archeology that any significant attempts at culture-historical reconstructions in Puerto Rico were made.

"The central theme of the Classificatory-Historical Period in American archeology was the concern for chronology. The name of the period, 'historical' carries this implication, at least insofar as the minimum history is a time-ordering of events." (Wiley and Sabloff, 1974:88). The provision of time depth and the gradual diachronic expansion of the cultural historical continuum is the hallmark of the period between 1920 and 1940 in Puerto Rican Archeology, the Classificatory-Historical Period I. Two figures stand out during this period, Froelich Rainey and Irving Rouse, both associated with the Caribbean Anthropological Program of Yale University. As has been noted earlier, some tentative attempts had been made by de Hostos and later Lothrop at trying to arrive at some sort of relative chronology for the different pottery wares found in Puerto Rico. In the early twenties Hatt, a Danish anthropologist working in the Virgin Islands, published the results of his investigations in St. Thomas, St. Croix, and St. John in which he arrived at a relative sequence which included, first, sites without any ceramics, second, sites with white on red painted ceramics and, thirdly, by a group which included ceramics with only red paint on them and bowls of totally different shape from the preceding white on red group, but with similarities to the ceramics of the Taino in the Greater Antilles (Hatt, 1924). In the now classic Origins of the Tainan Culture, West Indies, Sven Loven attributed the white on red ceramics, which were common in the Lesser Antilles and Virgin Islands, to an earlier Arawak Group, the Igneri, which were ultimately replaced by the Taino Arawaks of the Greater Antilles. At this time, Loven was unaware of the existence of white on red ceramics in Puerto Rico.

The existence of white on red ceramics in Puerto Rico was not reported until 1933 when Montalvo Guenard published illustrations of them from a site in Ponce and by inference, the presence of an earlier "culture" the Igneri which preceded the Taino.

In 1934 and 1935 Froelich Rainey, working with the support and cooperation of the Peabody Museum, Yale University, The American Museum of Natural History in New York and the University of Puerto Rico undertook archeological investigations in the island in furtherance of the Scientific Survey. Rainey learned of the white on red pottery from Montalvo Guenard and appreciating their importance he initiated excavations at the Canas site in Ponce where they had originally been found.

Excavating through the large shell midden at Canas Rainey came upon a hard packed yellow layer which he at first took to be sterile subsoil however continued excavations in this stratum revealed a deposit of disintegrated crab remains in a yellow sandy loam matrix with an abundance of fine white on red ceramics along with a number of burials and a whole new repertoire of cultural material (Rainey, 1940).

Rainey dug a number of other sites, most importantly the site of Monserrate at Luquillo, in which the stratigraphic sequence at Canas was duplicated. On the basis of these excavations, Rainey formulated a prehistoric sequence in the island in which he defined an earlier "Crab" culture which was followed or replaced by a "Shell Culture" (See Table A-1). In addition to this basic sequence Rainey made a number of other stratigraphic observations which were later to be fully exploited by the work of Rouse in 1936, 1937 and 1938. During these years Irving Rouse, continued the work the Yale Caribbean Anthropological Program. As part of his survey work Rouse complied a list of nearly 300 sites located throughout the island and selected 44 of these to carry out detailed stratigraphic excavations. Rouse's fieldwork during these years and his subsequent publication of the results as part of the scientific survey series stands out as the major work on Puerto Rican archeology. By a meticulous modal analysis, Rouse established the existence of six major ceramic styles on the island and

using these as a base he was able to reconstruct a fullfledged culture historical development scheme. He defined three major cultural episodes for the island.

(1) An initial episode characterized by a number of sites above major attribute was the absence of pottery, thus suggesting an initial occupation by rudimentary, preceramic, preagricultural populations oriented towards the exploitation of marine and estuarine resources.

(2) A second episode which witnessed the introduction of ceramics and agriculture into the island.

(3) A third episode which saw the development of a highly sophisticated socio-political and ceremonial organization and culminated in the Taino culture which prevailed in the Greater Antilles at the time of contact.

In what, on hindsight, appears to be the most problematic decision to sustain in the light of more recent research, Rouse took Loven's lead and applied ethnographic labels to these latter two cultures calling the initial ceramic occupation Igneri because of its association with white on red pottery and assigning the later episode to the Tainos. The problem of attributing ethnographically known labels to archeologically defined cultures is a touchy one but at the time Rouse felt the weight of the evidence was in his favor and proceeded to interpret the record accordingly.

This threefold cultural scheme was further refined, with the use of stylistic attributes of the defined ceramic styles as the basis for a five-fold temporal periodization. With minor adjustments and refinements and with the addition of an absolute time scale through radiocarbon dating this fivefold scheme still stands as the major framework for the cultural chronology of Puerto Rico.

The Classificatory-Historical II period extending from 1940 to 1960 saw a continuance of the interest in chronology although the latter part of the period is characterized by an increasing concern with context and function

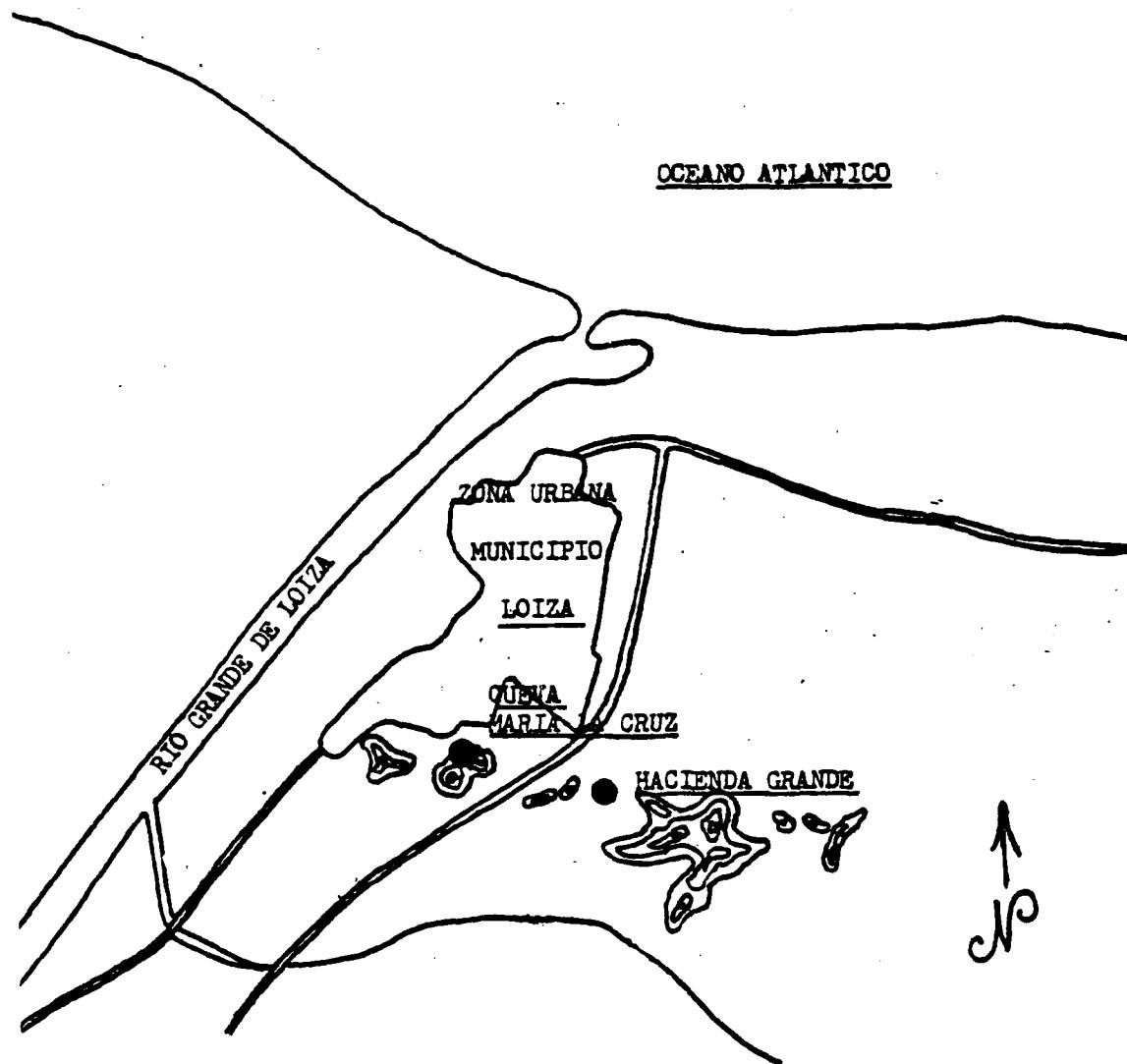


Figure A-1. Setting of Cueva María la Cruz and Hacienda Grande.

POTTERY	SHELL LEVEL	CRAB LEVEL
Types of Ware	Crude Ware without slip, polish or paint Thick, coarse-grained (predominating) Red Slipped Ware, pink to red (rare)	Polished and slipped Brown Ware Hard, thin fine-grained (predominating) Red Painted Ware Paint applied over polished and slipped Brown Ware (abundant) Red and White Painted Ware Painted designs applied over polished and slipped Brown Ware (abundant)
Shapes	Boat-shaped bowls (predominating) Some round bowl forms Vessel rims vertical or incurving	Round bowl forms (predom- inating) Oval shapes rare, no boat- shapes Annular bases Vessel rims principally wide-flaring but occasion- ally straight and incurv- ing
Handles and Lugs	Flat loop handles extending over rim on boat-shaped vessels Rectangular lugs on rim of boat-shaped vessels Semi-lunar lugs on rim of boat-shaped vessels Ridge lugs on boat-shaped vessels Modeled head lugs on round & boat-shaped vessels	D-shaped handles on walls of round bowls never ex- tending over rim Four distinct types Rectangular lugs on rim of oval and round bowls Semi-lunar lugs on round bowls Modeled head lugs on round bowls

Table A-1. Shell and Crab Levels Pottery Descriptions.
(From Rainey 1940:58-60)

POTTERY	SHELL LEVEL	CRAB LEVEL
Elements of ornamentation	Modeled head lugs on vessel rims Rough zoomorphic figures principally representing bat & human heads in the round Modeled figures on loop handles Geometric figures in relief & small, crude bat and human-heads.	Perforated knobs on vessel walls Modeled head lugs on vessel rims Polished, painted, well formed Unknown zoomorphic beings Semi-lunar, semi-spherical, and spherical-hollow with pellets Modeled figures on D-shaped handles Large, painted Like those figures recorded above
	Modeled figures on vessel walls Geometric & zoomorphic Incised decoration on the exterior of bowls in panels near rim Parallel line terminating the punctures Painted decoration	Incised curvilinear designs on the inside of shallow bowls (rare) Cross-hatch incised designs applied after firing Red painted designs outlined by incisions
	Six sherds with crude curvilinear figures in red on Crude Ware	Bowls with red painted lip Bowls red painted on one side Red & White Painted Ware Two color designs Two color designs with white inlaid in incisions

POTTERY	SHELL LEVEL	CRAB LEVEL
Associated Artifacts	Chisels	
Shell Objects	Hoes Celts Problematic Implements Discs Ornaments Three-pointed "Zemi"	
Stone Objects	Petaloid celts Tubular beads Hammers and rubbing stones Small carved zoomorphic Three-pointed "zemi"	
Bone	Worked manati ribs Small tubes Awls and needles Carved figures	Problematic Implements One spoon One cup two raffles One cleat-like object Rectangular adze-like celts White painted celts of chert, shape uncertain Rubbing stones Worked manati ribs

as opposed to style. Perhaps the major event of importance to the development of Puerto Rican archeology was the creation of the Centro de Investigaciones Arqueologicas in connection with the Museo de Antropologia, Historica y Arte of the University of Puerto Rico.

The center was originally headed by Ricardo E. Alegria who perhaps is the individual most responsible for developing a formal and indigenous archeological program and conscience on the island. Pursuing an active field program in the late 40's and early 50's, Alegria made a number of major discoveries. First, excavating at Cueva Maria la Cruz near the town of Loiza, Alegria formally established the existence of preceramic or archaic cultures in Puerto Rico (Alegria, et. al., 1955). Secondly, his investigations at the family estate of Hacienda Grande revealed a

stratigraphy and complexity of material culture during the initial ceramic occupation of the island hitherto unknown. A new stylistic variant was introduced into the ceramic sequence as a result of his work. The Hacienda Grande material came to be known as the earliest ceramic manifestation of the initial pottery bearing peoples to settle on the island (Alegria, 1965). In 1955, the Puerto Rican legislature created the Instituto de Cultura Puertoriquena and Alegria was named its Executive Director.

The early 50's also saw the official publication of Rouse's Porto Rican Pre-history, while his interests were expanded to include the question of origins and therefore his geographical horizons came to include not only the Greater and Lesser Antilles but their mainland connections, in particular Venezuela.

Thus, the Explanatory Period which commenced in 1960 - was entered into with Rouse refined, the archaic defined and Alegria firmly established as the leading voice of archeology and cultural patrimony Puerto Rico. While archeologists on the mainland were slowly gearing up for the New Revolution in archeology, the discipline in Puerto Rico remained at somewhat of a lull, at least if one looks at the publication record. Rouse continued to expand his studies and in 1964 published the classic synthesis "Prehistory of the West Indies" in Science magazine (Rouse, 1964).

Alegria assumed more and more administrative responsibilities as first Executive Director of the Institute of Puerto Rican Culture and later head of the Office of Cultural Affairs. In recent years, with the creation of Centro de Estudios Avanzados de Puerto Rico y del Caribe he is having a most productive quasi-retirement with the publication of a series of important pamphlets and books on a broad series of topics ranging from early graphic representations of American Indians to Taino mythology. Mela Pons de Alegria working out of the University Museum has also made some important contributions to the archeology of the island in her studies of prehistoric art and iconography.

The directorship of the Centro de Investigaciones was assumed by Luis Chanlatte Baik, a Dominican archeologist with a longstanding commitment to Puerto Rican archeology. In the last five years he has been making a number of outstanding discoveries of significance to the archeology of Puerto Rico, represented by the sites of Tecla in Guayanilla and Sorce/Lahueca in Vieques. Unfortunately most of his work is as yet unpublished.

A major development of this period has been the rise of a large cadre of professional and paraprofessional archeologists on the island. This has been fostered in part by the creation of the Centro de Estudios Avanzados and by the enlarged and active participation of other Caribbeanists in Puerto Rican archeology. Drs. Betty Meggers and Clifford Evans, promoted alternative approaches to the interpretation of the archeological evidence on the mainland as well as in the Antilles, and their Latin American colleagues such as Mario Sanoia and Iraida Vargas of Venezuela and Marcio Veloz Maggiolo of the Dominican Republic have provided a new outlook as well as new vitality induced by competing paradigms. Gary Vescelius, former Territorial Archeologist of the Virgin Islands has been in the vanguard, calling for a more formal systematization of archeological investigations.

Among the younger generation Ovidio Davila, as the Staff Archeologist at the Institute has carried out a program of archeological investigations at a number of prehistoric and historic sites, Juan Jose Ortiz Aguilu has devoted considerable energy to the site of Las Flores in Coamo, and Diana Lopez pursued the ceramic occupations on Vieques Island.

Another major development of the 70's has been the creation of a number of organizations primarily devoted to the study of archeology on the island, such as Fundacion Anthropologica, Arquelogica e Historica de Puerto Rico (FAAH), the Socieda Guaynia and the lesser known Fundacion Robert Stolberg Acosta which until recently maintained the Museo del Indio Antillano in Philadelphia. Gus Pantel has carried out an active program of archeological investigations for the FAAH.

These organizations have brought with them a new vigor in the archeological climate of the island by organizing and promoting symposia such as the first Puerto Rican Symposium sponsored by the FAAH and devoted to the Archaic, and the Simposio Sobre Problemas de la Arqueologia Antillana sponsored by the Sociedad Guaynia and funded through the National Endowment for the Humanities.

The recent upsurge in contract archeology which has resulted from Federal compliance requirements with various historic preservation mandates has encouraged the development of regional organizations devoted to survey and evaluation work. These include the Sociedad Guaynia under Juan Gonzalez, the Fundacion Arqueologica del Suroeste, and the Sociedad Espeleo-Arqueologica.

Archeology in Puerto Rico now stands as a threshold. The eighties promise to be a decade of progress. A new generation of archeologists is standing ready to reach into the past to enlarge the foundations of the island's patrimony, as it thrusts itself into the future.

PREHISTORY OF PUERTO RICO

The most up-to-date cultural chronology for Puerto Rico and the Greater Antilles was recently published by Rouse and Allaire (1978) and it is buttressed by a large array of radiocarbon dates which firmly place the Caribbean developments within the larger New World culture historical picture. In their review article, Rouse and Allaire have adopted a four age system - Lithic Age, Archaic Age, Ceramic Age and Historic Age. Within this framework, a sequence of complexes is reported, which replaces the old "styles". Groups of "styles" or complexes which seem to bear some genetic resemblance to each other have been assigned to "series" which in general practice have been assumed to represent archeological traditions (e.g., Willey, 1974).

THE LITHIC AND ARCHAIC AGES IN PUERTO RICO AND THE CARIBBEAN

The Lithic and Archaic Ages in the Caribbean are represented by a diverse group of seemingly unrelated complexes. They are represented in Cuba by the remains of the Cayo Redondo and Guayabo Blanco aspects, (Tabio and Rey 1969), characterized mainly by hammer grinders, shell gouges, stone balls, shell vessels and other stone materials. Guayabo Blanco is generally considered the earlier of the two, its main diagnostic trait being the absence of polished stone tools. A date of 2050 B.C. is given for this complex. On the island of Hispaniola, the evidence is somewhat more substantial. Four major preceramic complexes were distinguished there by Cruxent and Rouse (1969). They are in chronological order from oldest to youngest: Casimira, Mordan, Cabaret, and Couri. The youngest of these, the Couri complex is derived from a series of sites in northeastern Haiti. It consists mainly of ground stone artifacts including vessels, milling stones, balls, pegs and double bitted axes. Flint tools are also in evidence, including large knives, scrapers and projectile points that have central stems for hafting. These flint tools have recently been analyzed by Davila (1978). The Cabaret complex derived from a series of sites in the Port-au-Prince area. Artifacts are mainly of flint and include projectile points, with stems for hafting and long narrow flakes with restricted ends. They are described by Cruxent and Rouse as follows:

"In their retouching the Cabaret workers took pains to reduce or eliminate the bulbs of percussion of the striking platforms...."

The Mordan complex comes from the south coast of Santo Domingo. Flint boulders are abundant in the region and this provided the raw materials for the workers at Mordan. The complex is described as follows:

"The long flakes were apparently struck from cores with prismatic cross-sections; we say 'apparently' because no cores were recovered. The flakes, however, show the bulbs of percussion and prepared striking characteristic of flints struck from such cores...The Mordan workers did not follow the Cabaret practice of retouching their flakes to

facilitate hafting...(Both hafting and projectile points are absent.)...A few flakes show crude retouching on the edges, but most of them were apparently used just as they came from the core....."
(Cruxent and Rouse, 1969).

Three radiocarbon dates are available for Mordan: 2190(+130) B.C., 2450(+170) B.C., and 2610(+80) B.C. The Casimira complex is located inland from the area of the Mordan finds. In one of the sites the excavation was carried to a depth of 50 centimeters. The contents were exclusively of crudely made artifacts and was flint lower in quality than the cores at Mordan.

"The upper 25-centimeter section at Casimira bore flint of a quality slightly superior to that in the lower section as if the Casimira workers had used any flint at hand in the beginning but had later succeeded in finding a source of better material. Nonetheless, only a few flakes seem to be from prismatic cores, all the artifacts are strikingly larger and heavier than their Mordan counterparts and the flakes have thick, unretouched ends that would certainly have precluded hafting. None of the implements show evidence of retouching. Signs of wear indicate that the blades were used as scrapers and some of the heavier pieces served as pounders and choppers (Cruxent and Rouse, 1969)."

It should be noted that recent research by Pantel (1976) at the sites of Barrera-Mordan and Casimira has shed some doubt on the validity of the original interpretations at these sites. Pantel's work suggests that there is indeed a trend towards a refined blade industry in the upper levels at Barrera-Mordan but also points out problems with the original dates for the complex. A radiocarbon sample outlined by Pantel from his excavations yielded a date of A.D. 0+300 and A.D. 625+80 which tends to place this blade industry into the ceramic period.

At the Krum Bay Site in the Virgin Islands the evidence consists mainly of long, narrow celts or adezes made on igneous and metamorphic rocks by

bifacial chipping and subsequently ground and pecked. The complex had been dated at 450 and 225 B.C. (Vescelius, pers. comm.). Little evidence of a preceramic occupation has been found in Jamaica, the Bahamas or the Lesser Antilles.

Recent work by Davis (1974) in Antigua and Goodwin (1978) and Armstrong (1979) on St. Kitts have turned up archaic sites, however their artifact yield is disappointingly low and the archaic in Lesser Antilles remains generally undefined. Armstrong (1979) has recently provided a model of archaic subsistence and settlement in the Lesser Antilles which seems to provide a generalized pattern for the region.

The settlement pattern fits the model of nonrandom distribution with site location focused on coastal areas which provide protection and accessibility to navigable waters - The small size and infrequency of middens on the island (St. Kitts) indicate a small population with few contemporary sites, spanning a long period of thousands of years. The pattern of settlement is indicative of a series of short-term recurrent occupations. It is postulated that small bands of gathers moved through the islands making use of the archipelago's abundant resources. The actual pattern of flow of this movement is not yet definable (Armstrong 1979).

There is evidence for a preceramic occupation in the Southern Caribbean islands but the developments there are related to the mainland since, because of lowered sea levels, these islands did not become separated from mainland Venezuela until late Holocene times. For this reason, Trinidad has the oldest dated archaic complexes in the Antillian chain (Harris, 1976).

The Preceramic in Puerto Rico

Evidence of a preceramic occupation in Puerto Rico comes from a number of widely scattered sites across the island. These include Cueva Maria la Cruz near the town of Loiza, Cayo Cofresi situated on Jobos Bay south of the community of Las Mareas to the west of Aguirre, on the southern coast,

Cerrillos near Cabo Rojo on the southwest coast, Cano Hondo on the island of Vieques, and Cueva de los Gemelos in the interior part of the island near Morvois.

The existence of the preceramic period in Puerto Rico was first postulated by Rouse (1952). Of the 281 sites surveyed by Rouse 31 were found to be small shell heaps whose major characteristic was an absence pottery. Five of these heaps were tested by Rouse and the returns were so meager that Rouse was doubtful as to the actual significance of these sites. The artifact inventory was limited to battered pebbles, several with ground facets, a number of flakes made on flint or other stone, and shell fragments which may have served as tools. Utilizing the Coroso site in southwestern Puerto Rico as the type site Rouse proceeded to guardedly define a preceramic Coroso culture. According to Rouse (1952:386):

Not one of the specimens listed above with the exception of those few believed to be intrusive, can definitely be accepted as artifacts. The shell objects show traces neither of manufacture nor of use. The stone specimens may have been used, although not manufactured, but there is no certainty of this. Our only artifactual evidence for the existence of a Coroso culture is, therefore, negative: the absence, except for several supposedly intrusive sherds, of pottery and of the other manufactures characteristic of the pottery-making Indians.

The sites provide better evidence, in that they imply the presence of a nonagricultural, hunting, fishing, and gathering people who lived in small bands and moved frequently from place to place - a pattern absent, so far as is known, from the ceramic, agricultural periods. Even this evidence, however, is susceptible of different interpretation, as already noted. Until further work has been done, we can only say that there is no proof either for or against the supposition that a distinct Coroso culture existed before the Igneri and Taino cultures defined below.

In 1948, while carrying out excavations at the ceramic site of Hacienda Grande near Loiza, (Figure A-1) under the auspices of the recently established Centro de Investigaciones Arqueologicas, Alegria tested the nearby large cave of Maria la Cruz. He dug a total of 5 m² and the pits were excavated in one-foot levels. Levels of 1 and 2 both had some ceramics in them. However, levels 3 and 4 lacked pottery despite the fact that they displayed evidence of considerable human activity. There were heavy concentrations of faunal remains throughout the column including evidence of burning and thick deposits of gray ash. Human bones were also found at the base of the lowest level. This evidence led Alegria to conclude that:

"In spite of the paucity of unmistakable artifacts, the evidence for occupation of the cave by a nonceramic group prior to the advent of the Igneri phase people in the area seemed almost conclusive."

A joint expedition was mounted in 1954 by the University of Puerto Rico and Peabody Museum Harvard University, headed by Alegria and W. B. Nicholson with the purpose of carrying out extensive excavations at the Cueva Maria la Cruz.

A number of test pits, totaling 56 m² were dug into various portions of the hard-packed floor. In an attempt to refine the stratigraphy, these pits were dug in 10-cm. levels. The material recovered added substantial corroboration to the view that the cave contained a genuine preceramic occupation deposit. Thick concentrations of food remains, mostly animal and fish bones, crab claws, and shells, together with stratified layers of pure ash, were encountered in nearly every trench, particularly in the lower levels. All pits ended in clean sterile sand, whose light color contrasted markedly with the dark occupation deposit above it.

In some of the pits, sherds were encountered at any level; in others, the top most 4 or 5 levels contained scatterings of Igneri phase pottery fragments, always decreasing sharply in numbers with increasing depth. Actual artifacts of stone or shell were rare, but one type, described in detail below, was quite distinctive. Two burials in poor condition plus

fragments of human skull, were found, all at the top of the sterile sand sub-deposit. One of the burials was secondary; the other, found less than a meter away, was primary, extended, and face up. This last was the deepest evidence of human occupation found in the cave; 20 cm. of sterile sand lay between the base of the occupation deposit and the top of the skull, which was encountered at a depth of 150 cm. from the cave floor (Alegria, et al. 1955:116).

The most distinctive artifact discovered was the "pebble grinder" made on large, polyhedral fine grained waterworn pebbles or cobbles. All have a characteristic long and narrow facet which has been ground flat through extensive rubbing. Although more common in the upper levels these pebble grinders were found distributed throughout the matrix which may indicate their use in processing pigments, possibly red ochre. Other stone artifacts included hammerstones, "pebble choppers", and utilized flakes. Artifacts made on shell included one scraper and "shell plates" made from the outer tip of a strombus shell. Several pieces of modified bone were also found including "a manatee rib with a possible pared end....." (Alegria, et al. 1955:11F).

Algeria and Rouse returned to the site in the early sixties in order to obtain material for radiocarbon dating, and the material yielded a date of A.D. 40 for the preceramic occupation.

Cano Hondo, on the south coast of Vieques Island was one of the original five sites on which Rouse based his definition of a Coroso or preceramic culture. Rouse described the work at the site in 1938 as follows:

The site dug is situated at the top of a slight rise between two mud flats, 70 meters northwest of the Puerto Mosquito. It consists of a single shell heap 39 meters long, eight meters wide, and about 25 centimeters deep, lying in the middle of an otherwise empty pasture. The usual test pit, four meters square and divided into four two-meter square sections, was laid out near the southern end of the heap, where the shells appeared to be most numerous, and was dug through two

25-centimeter levels. In the first level, we encountered dark brown humus, tinged with ash and containing large amounts of shell. This gave way at a depth of 15 to 30 centimeters to sterile yellow sand. Rocks were common in parts of both strata. There was no sign of charcoal or bones.

The only possible artifacts were a stone hammer, a Strombus lip, two nodes of shell, five plain shell tips, eight fractured shell tips, and two pieces of coral. The shells included marine gastropods and pelecypods (Rouse, 1952:556).

The site was also excavated as part of the Vieques Archeological Project undertaken in November 1974 by Figueroedo (1975).

We camped at Puerto Mosquito for five days, laying out a grid covering the central portion of the site and surface-sampling using plan coordinates. A trench one meter wide was aligned north to south, two units 1.0 by 1.5 with an intervening balk 1.0 by .025 m being excavated down to bedrock, which was found at a maximum depth of 35 cm. Three superposed strata were found in both units. Soil samples were taken from the balk.

Three hammerstones were found on the site surface; the upper half of a ground stone celt, a conch-lip hammer, and several conch-tip 'picks' were found in Stratum I; one hammer-edge grinder, an edge grinder, some flakes and several conch-tip 'pick' were found in Stratum II, and no definite artifact was found in Stratum III. Midden shell was submitted for radiocarbon-dating from strata II and III, using Murex brevifrons and Cittarium pica respectively. In order to date an artifact and settle the question of whether three Coroso-type sites were aboriginal or not, the conch-lip hammer (Strombus costatus) was submitted from Stratum I.

The dates were as follows:

Stratum I	UGa-995	3010+70 B.P.
Stratum II	UGa-997	2705+70 B.P.
Stratum III	UGa-996	2855+65 B.P.

Gary S. Vescelius was kind enough to assess these dates on the basis of their reported isotopic fractionation and the secular fluctuations of C-14 approximately thereby the true calendric dates. According to this assessment, strata II and III should refer to 1580 and 1600 B.C. respectively. Stratum I yielded the oldest date, but this may be explained in terms of an old conch shell having been used as a tool at a later time; the true age of depositon may be estimated at 1560 B.C.

It will be seen, then, that our assumption, based upon preliminary data, that Cano Hondo belongs to the Virgin Islands Archaic has been borne out by our excavations. A celt akin to those from Grambokola was found in Stratum I, and edge grinders such as occur at the Krum Bay sites were found in Stratum II. The radio carbon dates for Krum Bay establish the probable occupation there to between 1700 and 1450 B.C. (Gary S. Vescelius; personal communication), dates contemporary with the occupation at Cano Hondo of perhaps 1600 to 1500 B.C.

Cayo Cofresi is perhaps the best reported archaic site in Puerto Rico, having to its credit the only detailed formally published site report. The site was excavated by members of the Sociedad Guaynia de Arqueologia e Historia under the direction of the Dominican archeologist Marcio Veloz Maggiolo (Veloz Maggiolo et al. 1975). The site is a large shell midden located in a mangrove complex fringing the western flank of Jobos Bay on the south coast of the island. The site is an oval shell midden with major and minor axes of 50 to 40 meters respectively. According to the investigators, the large midden is comprised of individual smaller middens each of which represents a synchronic unity and which could therefore be treated as a

single stratigraphic event both horizontally and vertically. Six trenches were dug in various parts of the site. Two of the trenches (1 and 2) were dug in artificial 25 centimeter levels, while the remaining pits were dug in 10 centimeter levels. The excavations were carried down to depths varying from 70 to 130 centimeters. The stratigraphy at the site seems to have been very complicated, with large ash lenses interdigitated among the main strata. Most of the cultural material, as well as most of the vertebrate faunal remains, seems to have been associated with these ash lenses. A fairly wide range of artifacts was recovered from the site including hammerstones, flint flakes and blades, choppers, pebble edge grinders, "picks" made out of various sections of conch shell (Strombus gigas), fish scalers made out of shell, manos or symmetrical grinders of two types of spherical and conical, as well as a whole range of scrapers made on stone and shell. Radiocarbon dates of 325 B.C. and 295 B.C. were obtained from the lower levels of the site. Faunal remains of the site consisted almost exclusively of shells in the upper levels, while the lower levels represent a more varied fauna including turtle, fish, and crabs, mixed with shells which are predominantly Arca species.

An unusual aspect of this site was the discovery of the remains of several infants probably less than 6 months old in the lower levels. In summary, the remains of Cayo Cofresi represent one phase of archaic island life focusing on the rich resources provided by the mangrove setting. Other aspects of the subsistence found which can be inferred from remains at Cofresi include hunting, and deep sea fishing. The ash lenses and human remains at the site indicate a semi-sedentary mode of existence.

Cerrillos is a large flint working site in the southwest coast of Puerto Rico (Pike and Pantel, 1974, Ortiz, 1976) near the municipality of Cabo Rojo. The site is located in one of the few areas in Puerto Rico which is rich in cryptocrystalline rocks such as flint, chert, jasper, and chalcedony. The site is located in a cane field, and consists of large quantities of flint nodules, artifacts and debitage. The assemblage contains the entire range of established known lithic artifact categories including cores, scrapers, burins, blades, points, and blanks of many types and sizes. The exact position of this site which the prehistoric cultural framework is unclear but it probably extends from preceramic to late prehistoric times. A date of A.D. 625 was obtained by Pantel from one of the excavation units.

The Cueva de los Gemelos is another archaic or preceramic site which is located in Barrio Barahona, Morovis in the northern part of the island. Test excavations were carried out by Davila in March 1977. According to Davila (1977):

Materials obtained from the excavations included single and double side grinding stones, used stone flakes, chopping tools, scrapers, hammerstones, flake cores, flake-cutting tools, pieces of red ocher and debitage. Among the food remains there were fresh water crabs (Epilabocera sp.), land snails (Caracolus sp.; Pleurodonte sp.), sea clams (Codakis sp.), and an extinct rodent called jutia (Isolobodon portoricensis). The earth debris consisted mostly of ashes, pieces of charcoal, burnt stones and sand.

Davila feels that the three major archaic complexes known from Puerto Rico can be said to represent at least three different types of ecological orientations.

Archeologically speaking Maria La Cruz, Cayo Cofresi and Los Gemelos cave represent three different cultural complexes. Although their stone tools and associated artifacts are technologically similar their ecological significance is not exactly the same. The three complexes

represent different modes of environmental adaptation. While the archeological materials of the Maria la Cruz complex are oriented towards coastal-river valley activities, Cayo Cofresi artifacts and associated remains correspond more to mangrove and sea gathering and fishing activities. Los Gemelos cave complex, on the other hand, is located inland where small game hunting and both animal and vegetal gathering are most likely economic activities. These archeo-ecological differences must have determined particular socioeconomic patterns in each of the three complexes. (Davila, 1977.)

The picture presented above of the various preceramic manifestations in the West Indies is essentially one of disparate elements with the only unifying theme being a negative one, namely, the absence of ceramics. The picture is one of "discontinuous distributions," (Rouse, 1960).

"Each island has its own complexes, the various complexes being unrelated...and each is characterized by its own types of artifact..."
(Rouse, 1964)

Attempts at organizing the data around some common base have been made and these have been recently reviewed by Lundberg (1979) Alegria and others (1955, 1965) have classified all these manifestations under an all-encompassing West Indian Archaic Tradition. Willey (1971) lumps the evidence with developments on the mainland under his Northwest South American Littoral tradition. Rouse also groups the island and mainland preceramic complexes within a Meso-Indian epoch but calls attention to the questioned mainland relationships.

More recently the Dominicans (Pina, Veloz Maggiolo, and Garcia Arevalo (1974)) have proposed a revised scheme for the Antillean preceramic evidence which groups sites into phases, subtraditions and major cultural traditions according to relative similarities in the assemblages, and taking into account the particular ecological setting and the opportunities which the environment offered to the populations. Thus, their definition of a number of subtraditions which they define as "el conjunto de fases arqueologicas

que presentan una secuencia tipologica similar unida a semejantes enfrentamientos con la ecologia circundante". (Pina, et al. 1974:3.) They have also attempted to place these subtraditions within a revised temporal framework which distinguishes two preceramic periods - a paleo-archaic and an archaic.

The Polish archeologist Janusz Kozlowski has also recently made quite a significant contribution to the study of preceramic cultures in the Caribbean (Kozlowski, 1974). Taking a cue from Cruxent and Rouse (1968) and applying an old world typological methodology to the analysis of the stone tools and assemblages he defined two major types of preceramic cultures - Paleo Indian and Meso-Indian cultures, then goes on to detail and name specific "cultural" manifestations within the categories. The Paleo-Indian culture which he labels Seboruco-Mordan, after the major type sites in Cuba and the Dominican Republic, is characterized by a technology based on flint working with the tool kit comprised of a large variety of tools made on blades and flakes. It is also characterized by the absence of ground stone tools.

A note of caution should be introduced here. As Emily Lundberg (1979) recently asserted:

In the West Indies, the presence of a flaked flint artifact in a particular assemblage has sometimes led to the assignment of that assemblage or sometimes just the particular item, as the "Paleo-Indian" category. The term "Paleo-Indian" has little to recommend it even under the best of circumstances, but if it means anything at all it has to be used in the sense in which it is generally employed in New World Archeology. In that sense, it refers to a stage of cultural development defined economically by big game hunting and technologically by the use of certain kinds of large projectile points. I submit, however, that by neither the technological nor the economic criterion is there any basis for applying the "Paleo-Indian" label to anything found

thus far in the West Indies. It has yet to be shown that any group of people living on these islands subsisted by means of big game hunting. Assemblages consisting mainly of flint artifacts, such as those Kozlowski calls "Paleo-Indian" can probably best be viewed as representing specialized aspects of the culture of a group of people who also produced a variety of other artifacts, including aspects of ground stone and/or shell....

Kozlowski further defines four Meso-Indian cultures again on the basis of stone tool technology.

- a. Funche culture
- b. Damajayabo - Couri culture
- c. Guayabo Blanco
- d. Carnero culture

These are characterized as follows:

1. The amorphic technique and poverty of retouched tools, with the presence of a poorly differentiated inventory of other stone artifacts (hammers, grinders, anvil stones) and shell products, are used as the basis for the distinction of the Funche culture.
2. A very poor set of chipped stone artifacts and the presence of numerous imports from the range of the Seboruco-Mordan culture (chiefly blade tools), along with the rich complex of tools worked by the techniques of pecking or grinding (hammers, grinders, mortars, pestles, axes, etc.) are the basis for the distinction of the Damajaybo-Couri culture.
3. A rich set of flake tools and the presence of bifacial tools and specific side-scrappers, along with the accompanying shell tools are the basis for the distinction of the Guayabo Blanco culture.

4. A very rich set of flake tools, mostly microlithic, along with the presence of numerous differentiated products worked by pecking and grinding are the basis for the distinction of the Carnero culture.
(Kozlowski, 1974: 73-74.)

The question of origins is perhaps the last which needs to be addressed in this consideration of the first peoples of the West Indies. Willey (1971) postulates single main line of development for the North and South American Littoral tradition cultures of the Caribbean area, from the mainland (Venezuela) out to the Caribbean by way of the Lesser Antilles. Rouse (1948), in his earlier writings was inclined more toward a North American origin for the preceramic cultures of the Indies, basing this conclusion on the great concentration of sites in Cuba and Haiti, adjacent to Florida, the resemblances of certain artifact types of the two regions and the lack of evidence in the Lesser Antilles. Subsequent discoveries in Venezuela e.g., the definition of the Manicuare complex with its many resemblances to the Cuban materials, caused him to modify his earlier position. In 1960 he posited three possible hypotheses concerning the original entry of man into the West Indies.

"The first would have him migrating from a single source, presumably eastern Venezuela, since that is the only place for which we have evidence from both the coast and the offshore islands of sufficient ability to travel by sea (Manicueare peoples on the coast in the Cumana area and on the offshore islands of Margarita and Cubagua). According to this theory, the confused picture of discontinuous distributions which we find in the Antilles would be due to parallel developments of local variants on the original Meso-Indian culture from eastern Venezuela. The second hypothesis would explain these local differences by postulating additional migrations from other parts of the Caribbean with which there are resemblances. The third hypothesis would instead assume that people from various mainland regions were accidentally carried to the islands by natural agencies."

The latter hypothesis was the one most strongly favored by Rouse and was based on G. Gaylord Simpson's zoogeographical model to explain mammalian

distributions in the West Indies. Simpson postulated that the only explanation for such divergent mammalian faunas as are found in the island was to assume that they were "colonized by waifs accidentally rafted out." In this theory he utilized both the ocean currents and the influences of the two major rivers discharging into the Caribbean, the Magdalena out of Columbia and the Orinoco, as the major agencies. He theorized that animals caught on natural rafts would be ejected into the Caribbean where the action of the northward tending currents would then carry them into the Antilles from opposite directions. A map showing the major currents shown in Figure A-18. Men wandering out to sea could very likely have been picked up by the currents in a similar manner. Thus, the problem of how the early nonceramic, nonagricultural inhabitants to the islands can be provided with a reasonable set of hypotheses. Kozlowski (1974:109) has also proposed a theory of "transcaribbean" migrations. According to him: The process of colonization of the Caribbean Islands should be considered" in three aspects:

1. As a result of the transcaribbean migration of Paleo-Indian peoples to Cuba and Hispaniola most probably in 4000-3000 B.C. (Seboruco-Mordan culture).
2. As a result of the circumcaribbean migrations of Meso-Indians, occurring in several successive waves:
 - (a) A poorly known wave of migration which gave rise to the Funche culture (it may have started from the mainland in 6000-5000 B.C. and reached Cuba around 2000 B.C.),
 - (b) A migration responsible for the origin of the Damajayabo-Couri culture in the Greater Antilles. If the hypothesis that this culture is derived from the El Heneal culture is correct, the outset of this migration might be dated at 3000-2000 B.C. or even earlier. In the Greater Antilles this culture appears in 2000-1000 B.C.

(c) A well-known migration of the people of the Carnero culture, who left the mainland in the first millennium B.C. to reach Cuba and Hispaniola at the turn of the era:

3. As a result of transcaribbean migrations in the late Formative period, which proceeded between South and North America, omitting Central America. It may well be that there were also sporadic contacts of the pre- and classic cultures of Meso-America and Cuba, which, however, did not bring about any lasting cultural changes in the Caribbean Islands.

Kowalski (1974: 109)

The initial transcaribbean migration is presumed to have been from Central America by way of the mid Caribbean Island chain which would have been exposed due to lowered sea levels. (This theory had previously been suggested by Rouse and Cruxent to explain the Mordan flint complexes in the Dominican Republic.)

Thus a significant consideration in the question of origins, migration routes and spatial distribution of archaic or preceramic assemblage needs finally to be addressed - changes in sea level during the Holocene. The question of changes in sea level during the Holocene and its relationship to archaic site location distribution has been addressed recently by a number of researches, including Nicholson (1976) Carbone (1978) and Vescelius (1978). Changes in the amount of land mass exposed was massive allowing several different possible routes of migration. It is not unreasonable to assume that given the rising sea level and the maritime orientation of archaic people a considerable number of archaic sites are probably under water, especially in the Lesser Antilles. The consolidation of land masses e.g. Puerto Rico and Virgin Islands and Trinidad and the mainland may also help to explain similarities in assemblages between areas which today are separated by water.

THE CERAMIC AGE IN PUERTO RICO

The Sequence

- Using Rouse's stylistic series as a base, the cultural development during the Ceramic Age in Puerto Rico can be grossly summarized as consisting of three major periods characterized by the Saladoid, Ostionoid, and Chicoid series respectively, representing a continuous sequence from white-on-red through largely plain to modelled - incised pottery. In his classic synthesis on Puerto Rican prehistory, Rouse concluded that the ceramics found in Puerto Rico could be grouped into 6 major styles.

The detailed descriptions of each of these styles with their spatial and temporal distribution and attributes are shown in Figure A-2. This figure essentially summarizes the information in Rouse (1952: 336-354).

Using these styles and their vertical distribution in his test pits he was able to generate a relative chronology as shown below:

Table A-2

Period IV: Boca Chica, Capa or Esperanza

Period III: Ostiones or Santa Elena

Period II: Cuevas style

Period I: No ceramics

On the basis of changes in frequency of certain traits or attributes he was able to further refine this sequence as shown in Figure A-2, along with the spatial and temporal context of the various styles.

Throughout the study, Rouse had found a small but persistent number of sherds which he considered to be of Lesser Antilles origins, with affinities to the material from Trinidad and thus classified them as trade objects. In 1948 Alegria, while excavating at the site of Hacienda Grande in the town of

CERAMIC STYLES OF PUERTO RICO (abstracted from Rouse, 1952)

STYLE	MATERIAL	AVG THICKNESS	SHAPE	DECORATION	HANDLES	RIMS
ESPERANZA	Intermediate between Boca Chica and Capa; sherds are coarse and soft but do not crumble; break easily; fractures coarsely granular, reddish-brown in color	7mm	simplicity of shape: rounded, blunt but not gross like Santa Elena; nondescript; unmodified round bases; incurving sides with blunt rounded keel; no necks; cylindrical rim coils	consists mainly of simple incised designs; spaced widely apart and broad; alternating parallel lines inclined are diagnostic; some applique and modelling; lugs, lumps and pugs; featherlike design	Symmetrical and Asymmetrical lugs	
CAPA	crude; unusually soft; fine clay float or slip coarsely grained interior; heavily impregnated with sand; tend to disintegrate; fracture color varies from brown to brick red	7mm	flat, angular and poorly proportioned; bases generally unmodified; shape hemispheric; keels and shoulders typical; narrow and incurving; broad apertures;	consists almost entirely of designs; no handles; lugs, shapeless lumpish shoulders; incised designs abundant; lines are narrow, relatively deep; spaced closely together on narrow shoulders	Geometric and Smooth lugs	
BOCA CHICA	fine and hard; surfaces smoothed; moderately thick; do not break easily; fractures firm and finely granular with tan to brown color	8mm	sherds are angular but not flat; sturdy; poorly proportioned; spherical bodies common; flat bases; round or boat-shaped bodies; blunt keels and turned shoulders are diagnostic; convex necks; ridges on rims	obvious and relatively complex; designs predominate; polishing more common than paint; incision highly elaborate on surface of turned shoulders; motives extend around in a band; incisions are broad		
SANTA ELENA	crude, coarse and fairly soft; surfaces uneven, only partially rubbed down; thick, break easily; fractures coarsely granular, disintegrate when rubbed, reddish brown	8mm	well rounded; surfaces and vessel walls strongly convex; appear to bulge; bodies circular or boatshaped; flat bases; spherical rim coil is diagnostic; rim thickened and rounded; strongly convex vertical sides	simple and obvious surface and structural; painting entirely red on only one or two elements of shape; lugs, rim points, amorphous lumps; applied or modelled designs with incision and punctation horizontal or vertical parallel incised lines on rims or shoulders	Vertical strip, Some loops, Lugs	
OSTIONES	fine and hard but do not ring clearly; surfaces smooth and finished; break easily; fractures firm and granular; fracture color medium brown tinged with red	6mm (wide range)	sherds generally flat, angular, poorly proportioned; flat bases common; annular bases generally absent; bodies circular, boat shaped, double or kidney shaped; keels and shoulders widespread, overhanging or vertical but not concave	structural decoration common as well as surface treatment; some plastic designs; surfaces painted red or black; paint covers whole vessel; all over polish; applied and modelled designs with incision and punctation also occurring; zoomorphic and some geometric	"Loop"	
CUEVAS	fine and hard; well made; ring like porcelain when struck with metal; hard to fracture; fractures firm and finely granular with colors brown to ivory/chocolate tinge	5mm	graceful; walls and surfaces curved; flat concave or annular bases; bodies circular with shoulders, keel, outflaring; inverted bell	surface painting and decorative designs; polychrome (early), bichrome (white-on-red), monochrome (late-red/black); incised designs (early); plastic designs on lugs; some crosshatching		

Figure A-2 Ceramic Styles of Puerto Rico.
(After Rouse, 1952)

Loiza, reported finding certain pottery traits, the most characteristic attribute of which was "fine-zoned crosshatched decoration and fine carved designs filled with white paint," which according to him, constituted the earliest ceramic horizon on the island. As it turned out, this material was the one which Rouse had classified as intrusive and of trade origin in his earlier collections. This constituted the first adjustment of the ceramic sequence.

In the early sixties, an absolute chronology was obtained through radio-carbon dating which placed Hacienda Grande at AD 120 and Cuevas at AD 510. With this exception, Rouse's scheme has remained unmodified since it was originally proposed. In recent years investigators have come to feel increasingly constrained by this scheme for a number of reasons.

- (1) The sequence is based primarily on stylistic attributes.
- (2) The labels Cuevas and Ostiones seem too broadly defined to clearly indicate the nature of the transitional or developmental process.
- (3) Other aspects of the cultural system are underemphasized.
- (4) New discoveries are forcing a stretching of original labels to encompass an even wider range of variability.

The main dissatisfaction derives from a concern with cultural process. In any consideration of cultural process variability is a crucial factor and the lumping of cultural manifestations into broad categorical labels (modalities in Rouse's terms) only serves to obscure the very process which we are trying to explain. Rouse's scheme provides the general outline and as such it was the major contribution in the history of Puerto Rican archeology. However, it is now time to fill in the details, refine the periods, and break down the time scale into smaller units in order to arrive at a more refined picture of culture history and culture process in the Antilles. Excavations at sites such as Tecla, La Hueca, Tibes, Las Flores, and

Collores in Puerto Rico and Prosperity in the Virgin Islands will ultimately enable us to fill in some of these blanks when detailed reports of the investigations are published, but for now the limited information which is available (generally unpublished) strongly suggests that an expansion of Rouse's sequence is definitely in order. A number of researchers have already suggested this (Vescelius, 1979; Davila, 1979; Veloz Maggiolo 1978, 1979). The most complete statement of the situation and at the same time the most useful because it provides a comprehensive yet parsimonious solution is that of Vescelius (1979). In what will undoubtedly be recognized as the second major milestone in Greater Antillean archeology, Vescelius has dealt with the problem of cultural taxonomy in the Caribbean in New Frames of Reference for West Indian Archeology (Vescelius 1979).

According to Vescelius his new taxonomic scheme can be viewed as:

...a refinement of the prevailing scheme, the main features of which were formulated by Rouse and Cruxent in the late fifties...In the rather simple form in which it was originally laid out, the Rouse-Cruxent scheme involved the assignment of individual assemblages to cultural complexes of a fairly specific nature, followed by the ordering of those complexes into larger classification units called series. (This represents something of an overstatement, in that Rouse and Cruxent, in dealing with assemblages containing pottery, really limited themselves to the classification of just a portion of the material remains - to the classification of the pottery alone, and to the definition of the partial complexes they called "styled"...The series concept has proven to be a very useful one here in the Caribbean area. There has been a tendency to replace the word "series" itself with the term "tradition," but the basic notion remains the same...I think, however, that we require a somewhat more elaborate framework than the simple one devised twenty years ago by Rouse and Cruxent. For one thing, there is, as I see it, a pressing need for some sort of intermediate taxonomic unit--something less specific than the complex or style but more specific than the series or tradition. I propose to refer to a unit of such a grade or level as a pattern...The Saladoid cultures of the Virgin Islands, for example, can be sorted out,

tentatively into three patterns: an early (and very wide-ranging) one, which I will call Cedrosian; an intermediate one, which I will call the Cuevan, and a later one which I will call the Longfordian.

There is also a need for a taxonomic unit more specific than the complex or style...Though the term "phase" has frequently been used, in many different parts of the western hemisphere, more or less synonymously with "complex" or "style," I would prefer to reserve it for application to the most specific units we are capable of defining - to subdivisions of those larger units currently labelled as complexes or styles.

Fundamentally, then, the classificatory scheme I am currently using is one involving taxonomic units of four different grades or levels of specificity. In order of decreasing specificity (or increasing generality), those units are: the phase, the complex, the pattern, and the tradition (or series).

Using this hierarchical nested approach it is then possible to generate a much more detailed picture of culture-historical developments. As an example, the Soladoid experience in Puerto Rico which has traditionally been shown in chronological charts as

Puerto Rico
Cuevas(s)
Hacienda Grande(s)

can be enlarged as follows:

<u>Phases</u>				
<u>Tradition</u>	<u>Pattern</u>	<u>Complex</u>	<u>West/South</u>	<u>East/North</u>
	Longfordian (Late Cuevan)	Late Cuevas		Cuevas II
			Tecla II	
Saladoid	Cuevan	Early Cuevas		Cuevas I
				Hacienda Grande II
			Tecla I	
	Cedrosian	Hacienda Grande/ La Hueca		La Hueca I
				Hacienda Grande I

This can be done for the entire prehistoric sequence in Puerto Rico as shown in Figure A-3. Obviously this makes for a far more comprehensive view of the culture history of the island.

Vescelius (1979) has also developed a much more refined chronological scheme utilizing Eras, Periods, Epochs, and Sub-Epochs as the general time units. This scheme attempts to resolve the chronology into minimal units of 50 years duration. The revised chronological scheme proposed by Vescelius for the Caribbean is shown in Figure A-4.

The Saladoid Experience

As is shown in Figure A-3, the Saladoid experience in Puerto Rico can be divided into at least three main patterns and complexes each represented by a number of different phases. Davila (1979) has recently suggested this tripartite division by recognizing three successive complexes beginning with Hacienda Grande and ending with Cuevas with the recently discovered Tecla complex sandwiched in between.

The Hacienda Grande Complex

As has been mentioned previously, the Hacienda Grande complex was originally defined by Alegria.

The importance of the Hacienda Grande site lies in the presence of certain pottery traits which seem to indicate that it represents the earliest immigration of pottery making Indians into the island. The fine-zoned crosshatched decoration and fine carved designs filled with paint, which are not present in the other Period II sites in Puerto Rico, establish a relationship with the Saladoid sites in northeastern Venezuela. (Alegria, 1965.) (See Figure A-5.)

A radiocarbon date of AD 120 was obtained for this complex. Although Alegria indicates that these traits are absent from other Period II sites, it should be noted that many of Rouse's Period II sites contained traces of Hacienda Grande material in their lowest levels which because of their low frequency Rouse considered intrusive. Therefore, it should be kept in mind that excavations at these sites should ultimately yield other Hacienda Grande components. Davila (1979) in his description of the complex lists the following traits:

1. White on red painting.
2. Modelled and painted adornos representing anthropomorphic and zoomorphic figures.
3. Crosshatched incised motifs executed on the dry clay prior to firing.
4. D-shaped handles which do not extend above the rims.
5. Stone axes or celts which are rectangular-plano and convex.
6. Beads made on semiprecious stones such as amethyst, serpentine, jadite, milky quartz, etc.
7. Amulets made on green stones as well as shell and bone.
8. Subsistence based on manioc cultivation and exploitation of a diverse fauna with emphasis on crabs, fish, birds and mollusks.

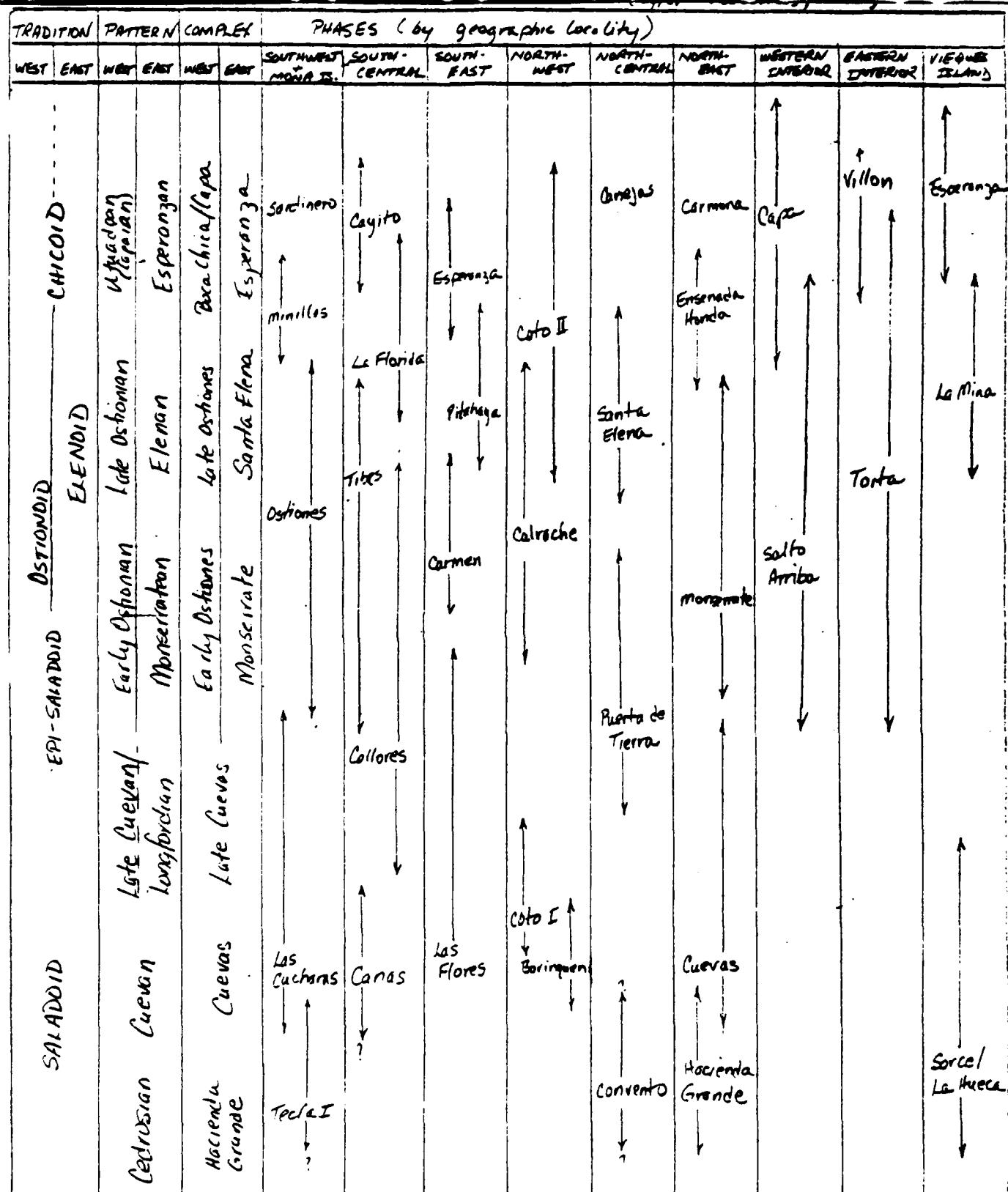
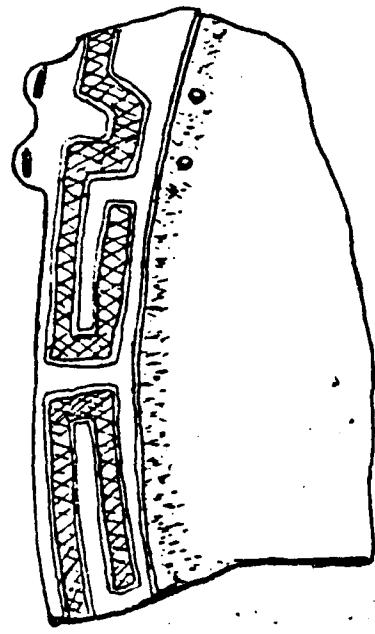


Figure A- 3. Taxonomic Framework for Puerto Rico.
(After Vescelius, n.d.)

ERA	PERIOD	EPOCH	Definition
1620 AD		1	
1531	5	5A	
1493		2	From initial colonization to abandonment of gold mining + abolition of Indian Slavery
1493		1	From discovery to initial colonization of PR
200		4G	"Chicoid" - Esperanza times in the east; Capitan times in western Puerto Rico
1300 AD		4F	Later Elenoid times in the east. Boca Chica influences. Establishment of port of trade at Cayito ?? Late Achenes times in the west
1100 AD		4E	Elenon (early Elenoid) times in VI and eastern P.R., middle Oftunes times in western P.R.
900 AD	4	4D	Monserratean times in eastern P.R.; early Orthinoid times in western P.R.; Richmondian Times in V.I. (Epi-Salodoid)
800 AD		4C	Longfordian times in eastern P.R. + V.I. ("Late Cuevas")
600 AD		4B	Cuevan times ("Early Cuevas")
350 AD		4A	Cedrosian times in Puerto Rico and the Virgin Islands. Hacienda Grande, Saice, Tecla I, Proprietary
100 AD		3D	Monaca Cross
300 BC	3	3C	Late preceramic times. Begins with establishment of a camp at Krum Bay. Ends with establishment of a Salodoid (Cedrosian) settlement at Hacienda Grande (or at Proprietary site, St Croix, US).
700 BC		3B	
1100 BC		3A	caño Honda
1500 BC	2	2E	Early preceramic times in West Indies. Begins with establishment of a camp at Bonnari Trace, Trinidad.
2500 BC		2D	Ends with the establishment of a camp at Klein Bay, St Thomas, VI.
3500 BC	2	2C	
4500 BC		2B	
5500 BC		2A	
1			Ante-dates the initial colonization of the West Indies.

Figure A- 4. Chronological Framework for Puerto Rico and the Virgin Islands.
(After Vescelius, n.d.) A-37



INCISO
ENTRECRUZADO

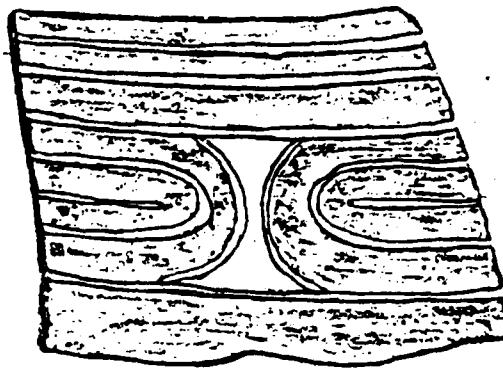
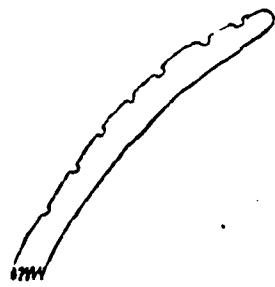


1:50
HACIENDA GRANDE
LOIZA, P.R.
HG-1005



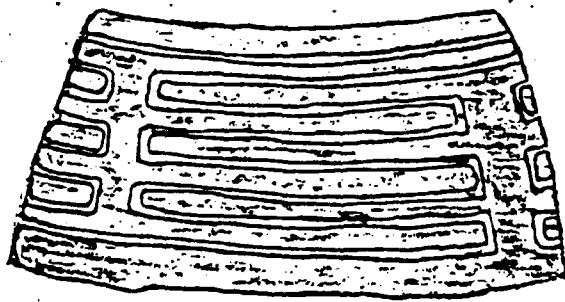
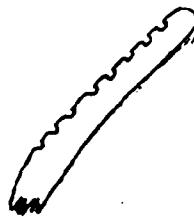
(Courtesy of Miguel Rodriguez)

Figure A-5 Hacienda Grande Complex.
(Courtesy of Miguel Rodriguez)



H.G.-101

- BOJO
- BLANCO
- INCISO
RELLENO DE
BLANCO



H.G.-1012

1:1

HACIENDA GRANDE
LOÍZA, P.R.

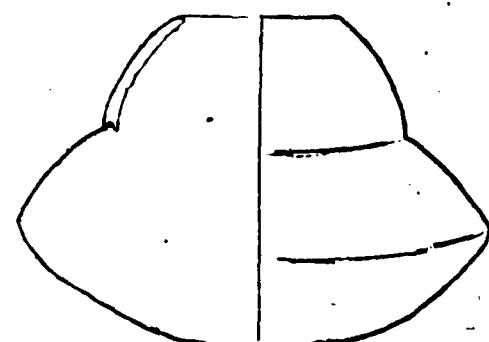


Figure A- 5. Hacienda Grande Complex.
(Courtesy of Miguel Rodriguez)

Chanlatte's work at Tecla, a site located in the Central Rufina, Guayanilla gives us perhaps the most detailed insights into the Hacienda Grande way of life. The site consists of a series of stratified deposits in a canefield whose surface manifestation consists of a series of elliptical shell middens. These middens are underlain by a series of strata with cultural material extending to a depth of 80 cm. Ostionoid material is present in the upper 30 cm of the site and is generally confined to the shell midden aspect of the site while the underlying strata are totally different in character, with shell being a minor element in the matrix, while the remains of a diverse fauna with a heavy emphasis on crabs make up a major portion.

Chanlatte was able to discern a series of spatial and temporal relationships between the various deposits which when looked at in toto give a fairly coherent picture of the tripartite sequence which constitutes the Saladoid experience from approximately AD 100 to AD 600. The initial period here is placed as part of the Hacienda Grande complex, in which major characteristics include a highly sophisticated ceramic technology, e.g., polychrome painted wares. Much of the pottery is generally smaller and finer than the later periods, suggesting to Chanlatte that certain of these vessels were prototypes for the later larger items. There are indications of differing methods of production between presumably ceremonial and utilitarian vessels. Other traits include incision filled with white paint; faunal remains consisting primarily of crabs, vertebrates, (fish, turtle, birds) and gastropods in decreasing relative abundance.

Our knowledge of the Hacienda Grande complex has recently been considerably enlarged by Chanlatte's discoveries at the site of La Hueca in Vieques. In fact, the quantity of Hacienda Grande materials at La Hueca and features of the assemblage are so unique that Chanlatte has now postulated a totally new and culturally distinct manifestation, asserting that the "huecoids" were an advance group who arrived in the Greater Antilles without "contamination" from the Saladoid peoples. Based on the uniqueness of the assemblage at La Hueca which consists primarily of the following traits:

- (1) Ceramics without paint but with zoned incises crosshatching ornamentation as well as modelled and incised figures as handles with the incisions sometimes filled in with white paint.
- (2) An incredibly rich lapidary industry represented by hundreds of zoomorphic and anthropomorphic amulets made on exotic stones indicating extensive trade contacts with mainland South America and possibly Central America.
- (3) A woodworking technology represented by many stone axes and shell adzes, gouges, etc.

Chanlatte has concluded that at the beginning of the Christian era there were two distinct migrations - one of Saladoid peoples bringing with them the painted tradition and a parallel one of "huecoid" peoples both of which generally settled in close proximity to each other, which would account for the intermixing of traits which is found at most of the early Saladoid sites. A unique aspect of the Huecoid assemblage is the presence of condor-like pendants with both human and animal figures clasped in the claws. These have been considered unique in the Antilles and Chanlatte feels they resemble Central American materials. However, it should be noted that Fewkes (1909) illustrates an identical specimen which he purchased in Trinidad. The presence of the item in Trinidad would seem to strengthen the connection between the Huecoid material and the Cedros remains in Trinidad which Rouse had considered ancestral in the Antillean Saladoid sequence and which had originally caused him to label some sherds with huecoid traits from his "Cuevas" sites as being of Lesser Antillean origin and therefore intrusive. One interesting aspect of Chanlatte's theory is that he sees the huecoids as the cultural base from which the ostionoid and later Taino cultures were derived because of their emphasis on modelling and incision, as well as stone working.

(Chanlatte ve a los huecoides "como la base cultural propiciatoria para la creacion del estilo ostionoide...Tambien consideramos que son ellos quienes mas tarde se transforman independientemente en lo que hoy

conocemos como cultura Taina...No desestimamos que los estilos ostionoides y chicoides absorbieran algo de las manifestaciones culturales saladoides, pero no es la pintura lo fundamental en los rasgos de la ceramica Taina sino el modelado y los disenos incisos, asi como su rica gama de amuletos liticos y de concha solo comparables con la produccion huecoide....En cambio, el saladoide y su atractiva ornamentacion pintada se diluyen lentamente a su paso por las Antillas Mayores".) (Uguarte, 1979.)

This represents rather elaborate theorizing based on the excavation of one site and its ultimate validity awaits further investigation. Chanlatte's view of Huecoids and Saladoids coexisting side by side is intriguing and it should be possible to evaluate the nature of the interaction that went on among these early migrants if such was the case. One thing stands out, i.e., all three sites in which these early complexes have been found are located in extreme proximity to the coast and this seems to be the major feature of the initial settlement pattern. What happened in this early phase which apparently lasted until about AD 350 and which ultimately gave way to the white-on-red florescence represented by the early Cuevas complex remains a mystery.

Early Cuevas

The Early Cuevas complex can be tentatively placed in between AD 350 and AD 600. Certain minor shifts in emphasis are notable in the transition from Hacienda Grande to Early Cuevas (or from Tecla I to Tecla II). In the subsistence base there seems to be a decline in the emphasis on crabs, and there are higher counts for griddle fragments. Polychrome painting disappears along with fine zoned crosshatched incision and the ornamentation which in the initial period seems to be sometimes figurative, sometimes geometric, is replaced by a highly abstract and formal representational system which melds elements of both aspects of the earlier system of decoration. Vessel shapes also apparently become enlarged (Chanlatte, 1976) and there seems to be a difference in ceramic technology between the decorated

vessels and the presumably utilitarian plainer wares, although this may be a carryover from the early phases. The typical ceramics of this period are the classic white-on-red wares.

Sites begin to be located further inland and there is a much larger number in which early Cuevas material is manifested.

Late Cuevas

The period between AD 600 and AD 800 to which the Late Cuevas complex is assigned is generally assumed to be transitional although the nature of the transition has engendered considerable debate. Whether there was an in situ development, which ultimately culminates in the Oستionoid tradition or whether the Oстionoid manifestation represents an actual migration of new peoples bringing with them new systems of reference (e.g. in ceramics, subsistence, settlement pattern and beliefs) has yet to be settled. Rouse believes in the former while Alegria asserts the latter. The answer is probably somewhere in between with both stimulus diffusion and environmental change being the possibly significant factors (Carbone 1979).

Perhaps the site which holds the key to this transition is the classic type site of Cuevas near Trujillo Alto which has one of the deepest stratified sequences on the island. Rouse excavated through ten strata which according to his description represented 5 major cultural deposits separated by 5 strata of relatively sterile alluvium. At this site, 68 white painted sherds, limited to the bottom three levels were found out of a total 2974 which are attributed to the "Cuevas" style. The evidence indicates that the small portion of the site which still remains intact offers an excellent possibility for providing the most detailed look at the nature of this transitional phase. The site of Tibes in Ponce may also shed some light on this complex since white on red materials are found stratified below the later Oстiones deposits. Sites in general during this period are located further inland with some penetration of the mountainous interior. According to Davila (1979) the materials indicate an impoverishment in ceramic technology and an abandonment of many of the previous decorative modes including

the white on red painting. [La verdad es sus materiales tienden a evidenciar un decaimiento en las tecnicas afareras y un abandono de muchos de los modos decorativos anteriores, entre estos la pintura blanca sobre roja (Davila, 1979).]

There is a great variety of body ornaments including beads and amulets made of shell, bone and stone. Stone artifacts in fact increase in frequency, especially petaloid celts. The diet is also more varied. At Tecla there is the beginning of an emphasis on the hutia, a notable shift towards gastropods and pelecypods (which will ultimately dominate the Ostiones diet) as well as greater emphasis on the manatee.

In summary, a number of major points should be made about early Saladoid cultures in Puerto Rico. The tremendous technological accomplishments which are in evidence in the early Saladoid/Huecoid materials should easily put to rest the conception of these early migrants as primitive, tropical forest agriculturalists. This is evident in the magnificence of the lapidary industry at La Hueca, in the excellence of the early Hacienda Grande ceramics as well as the later yet more impressive inverted bell-shaped white on red bowls and the richness, complexity and formality of the symbolic system with which they are decorated (see Petitjean-Roget, 1973).

The evidence for a trade or exchange network in semi-precious stones (See Vescelius and Robinson, 1979) indicates that one is dealing with a rather complex sociocultural situation. At the very least a sharp division of labor should be assumed, as well as the existence of specialized artisan (craft specialization) classes or groups, which may possibly hint at a hierarchical social organization. Overall these early Saladoid manifestations are reminiscent of some of the Intermediate Area chiefdoms in their exuberance. Allaire (1979) has recently suggested the the raison d'etre of Saladoid iconography may be the same as the logic behind the representations of mythical beings carved by Northwest Coast tribes on their food

containers. The latter were utilized during potlatch ceremonies associated with the affirmation of status, rank and affiliation. It is not unlikely that Saladoid vessels may have had similar roles in an elaborate socio-cultural system.

The Ostionoids Experience

There is a major problem in dealing with the Ostionoid experience in Puerto Rico because of the transitional position which it occupies between the highly distinctive early and late ceramic styles and cultural manifestations. The problem has been aptly defined by Willey (1971) as follows:

In appraising archeological sequences one is often inclined to dub certain phases or complexes as "transitional." Frequently, this is because they are discovered after an earlier and a later phase of the chronology have been established and fixed in the mind as points of reference. The new intermediate phase is then seen to resemble both and to form a sequential link between them so that, in a sense, "transitions" are a device to the archeologist. With Ostiones, however, this "transitional" designation seems exceedingly apt. We see styles very obviously in the flux of change. The clear patterning of the white-on-red pottery types of the Saladoid subtradition melt away into the nondescript plain and monochrome wares of the Ostionoid styles. The monochromes are red slipped and smooth finished, and the distinctive inverted bell-shaped bowls give way to straight-sided or incurved casuelas...(Willey, 1965).

The problem is a historical one and it was first dealt with by Rouse in his work in the 1930's. In his 1937 article in the Proceedings of the National Academy of Sciences, entitled NEW EVIDENCE PERTAINING TO PUERTO RICAN PREHISTORY he cited the discovery of an intermediate period transitional culture between the Salado and Shell cultures, as a result of his work at a site in Rio Grande. He announced his discovery as follows:

The second discovery made last summer was a stratigraphical sequence containing a transition from Crab to Shell Culture material. This sequence was observed in the two deepest sites excavated, one near Trujillo Alto and the other in the municipality of Cidra. At the bottom of the Trujillo Alto site, 2.75 meters below the surface, were typical Crab Culture sherds. A comparatively large number of these sherds were decorated, predominately with red and white painted designs. There was a gradual change in the nature of the sherds in the intermediate levels of this site, and at its top very few of the sherds were decorated, and these only with red-painted bands. In the lower levels of the Cidra site, 2.50 meters deep, the sherds were of the same general nature as those found at the top of the Trujillo Alto site. There was again a gradual change in the intermediate levels, and at the top of the site the number of decorated sherds was much larger. These sherds, however, were decorated characteristically with incised designs of different types than the painted designs. They were typical Shell Culture sherds.

This transition from the Crab Culture to the Shell Culture may be interpreted as follows. When the Trujillo Alto site (at least the part excavated) was first settled, the inhabitants decorated their pottery primarily with designs painted in two colors, red and white. Gradually, they abandoned two-color painting in favor of simple red painting, and at the same time they left more and more of their pottery undecorated. At the time when the Trujillo Alto site was being abandoned and the Cidra site was being settled, the fashion of leaving the pottery undecorated was at the peak of its popularity. Eventually, after the Trujillo Alto site had been abandoned, this fashion passed the peak and began to decline in popularity. The reason was that a new technique of pottery decoration, incision, came into use and began to be employed more and more frequently. The later inhabitants of the Cidra site incised proportionately as much pottery as the original inhabitants of the Trujillo Alto site had painted.

The time of habitation of the Trujillo Alto and Cidro sites may be divided roughly into three periods, corresponding to the times when it was most fashionable to paint the pottery, to leave it undecorated and to incise it. These three periods may be called the Crab, Intermediate and Shell Periods, respectively.

When Rouse actually analyzed what this intermediate period represented he was confronted with a methodological problem. He first used the Collores site as the type site for the definition of this transition with the following list of traits.

COLLORES TYPE

Characteristics Always Present

1. Boat-shape of bowl
2. Inturned shoulders
3. Ornamentation before the clay was relatively dry
4. Ornamentation on any part of vessel
5. Affixation
6. Loop handles
7. Engraving-incision
8. Ovoid incised design
9. Application
10. Sigmoid applied design
11. Limb design
12. Ridge on inside rim
13. Modelling
14. Red slip (applied before firing)
15. Red line painting (applied before firing)
16. Red painted rims

Changes in Frequency of Characteristics Always Present

1. Boat-shape of bowl (rare in earliest forms)
2. Inturned shoulder (rare in earliest forms)
3. Loop handles (rare in latest forms)
4. Engraving-incision (rare in earliest forms)
5. Ridge on inside rim (rare in earliest forms)
6. Modelling (rare in earliest forms)
7. Red slip (rare in latest forms)
8. Red painted rims (rare in latest forms)

Characteristics Not Always Present

1. Thickened, round rims (only in late forms)
2. Vertical strip lugs (only in late forms)
3. Flat lugs (only in early forms)
4. Monkey lugs (only in late forms)

This period later became Period III in Rouse's revised chronology and was further subdivided by him into subperiod IIIa in which incision was absent and IIIb in which incision predominated. Rouse later concluded that the Collores site was atypical and that the site of Ostiones provided a more accurate representation, thus the type was renamed after the Ostiones site on the west coast of the island. The big problem with this style was that in many instances it was difficult to distinguish between material which was late Cuevas and early Ostiones. Indeed the paradox was that while major cultural changes were taking place in this transition the ceramic evidence tended to obscure the picture by resisting definition Rouse's final characterization of the temporal and spatial variations in the style was as follows:

Variations within the Style. As pointed out by a number of previous writers (see above, pp. 317-18), Ostiones pottery has varied considerably during the time of its existence (from Period IIIa to IIIb). The earliest examples of the style, e.g., at the bottom of the site of

Ostiones, are difficult to distinguish from Late Cuevas pottery. As one proceeds upwards through the levels, the distinguishing characteristics of the style, as listed above, become more and more pronounced. The following changes, among others, take place: (1) Thickened lips beveled inwards are common in the lower levels, as in the previous Cuevas deposits, but in the upper levels their place is taken by bevels distinct from the lip; (2) red paint, at first limited to single elements of shape such as the beveled lip, becomes increasingly over-all; (3) plastic designs increase in frequency and complexity, with application, incision, and punctuation more and more lavishly used to delineate the elements of the designs; and (4) incised designs reappear after having been absent during the second half of the period of existence of the Cuevas style (Period IIb). It is probably no accident that the incised designs are situated in the area of the bevel, the position previously favored by both Cuevas and Ostiones potters for the application of red paint.

Local variations in style, the beginnings of which can be traced to late Cuevas pottery, become increasingly common from the earlier to the later levels (Periods IIIa to IIIb). The pottery is the best made and the most elaborately decorated on the west coast of Porto Rico. As one moves eastward, it becomes progressively more crude and plain. (This is presumably the reason that Rainey has emphasized the crudity of Ostiones pottery more than we do. He considered the central, rather than the western, pottery to be typical (Rainey, 1940: 58).) Surface decoration and incised designs, in particular, are more common in the west than in the east. On the other hand, plastic and especially painted designs are more common in the east than in the west. The sherds appear to be thicker and less angular in the east.

The above variations are subject to the restriction, already noted, that during the second half of the period of its existence (IIIb), the Ostiones style was limited to the western half of the main island, having apparently been replaced in the eastern half, as well as on Vieques Island, by the Santa Elena style. The sites along the line of

contact between the two contain examples of both styles. In addition, some modes characteristic of the Santa Elena style are found on Ostiones sherds, and vice versa. Nevertheless, it is rarely difficult to distinguish between the two.

(Rouse, 1952)

Thus Rouse's chronological framework for Puerto Rico during this intermediate period was as follows:

WEST	EAST
Late Ostiones	Santa Elena
Early Ostiones	

More recently, Vescelius has felt it necessary to question the utility of the Ostionoid label. He argues that:

by AD 800, the Longfordian and "late Cuevan" cultures of the northeastern Antilles had been transformed into cultures of an early Ostionian, Monserratean and Richmondian type. There is some question in my mind as to whether it is really useful to categorize these cultures as "Ostionoid" (as has usually been done). The Monserratean (of eastern Puerto Rico) and the Richmondian (of the Virgin Islands) could just as easily be thought of as "epi-Saladoid;" and the same may even be true of early Ostiones (in western Puerto Rico). Regardless of how these terminological issues are eventually resolved, it seems to me to be fairly clear that these cultures all represent a last gasp of the Saladoid tradition--the tail end of a continuous developmental sequence extending from the Saladeran to the Cedrosian to the Cuevan to the "late Cuevan"/Longfordian to them. Most of the innovations that occurred can be construed as having been of a local nature. There may have been a certain amount of long-range contact throughout this time span--it is quite possible that there was some trading going on between

Puerto Rico and the Virgin Islands on the one hand and the South American mainland on the other, and it is quite certain that there was contact with the lower Lesser Antilles and/or Trinidad (for pieces of tradeware crop up occasionally in the deposits dating from Saladoid times); but influences from that direction would seem to have been minimal (pottery-wise, at any rate).

(Vescelius, n.d.)

Thus, Vescelius' revised chronological scheme for the various cultural patterns would be as follows:

WEST	EAST
Late Ostionian	Elenan
Early Ostionian	Monserratean

Recent work at sites such as Tecla, Tibes, Monserrate and Collores should ultimately help to clear up and better define these Early/Late and East/West dichotomies. Unfortunately, with the exception of Tecla, most of the material is unpublished so we have to live with merely a typological glimpse at the cultural situation. The Ostiones site on the west coast is the type site for the western manifestations while in the east the site of Monserrate in Luquillo, serves to define the Monserratean pattern while the site of Santa Elena is the type-site for the Elenan manifestations.

Since the Monserratean pattern is a new entity in Puerto Rican archeology, it merits a more detailed consideration. Rainey's excavations of the shell culture in Mound A at Monserrate revealed a number of puzzling differences between the ceramics at the site when compared to shell culture ceramics from his other sites. Among the significant variations were the absence of modelled figures on loop handles, the absence of certain types of modelled lugs on rims as well as "a large number of sherds bearing crude red painted designs." These differences led Rainey to conclude that the Mound A deposits represented an "earlier phase" of the shell culture.

Recent excavations by Peter Roe of the University of Delaware into the truncated remains of mound C have shed considerable new light on this cultural manifestation (personal communication). The ceramics have not been analyzed but the suggestion is that the materials are definitely transitional from Saladoid to Oستionoid. The interesting results from the excavations pertain to the faunal and human osteological evidence. According to Roe, the faunal materials include species of all of the possible available modern habitats, except the mangrove swamps which are presently so extensive in the vicinity of the site. The human osteological evidence also indicates that the habitats exploited were mainly the shallow water and deep water niches as evidenced by the high rate of attrition on the molars which implies a large amount of sand in the diet. Thus, the suggestion is that the mangrove habitat was not being exploited and it can further be postulated that the reason it was not being exploited was because it wasn't there. Mangroves are maintained by the waters of the north coast rivers as they are distributed across the lowland settings. The absence of mangroves would imply a major climatic shift to more arid conditions. Carbone (1979) has hypothesized that it is precisely this kind of transition from humid to arid which provided the impetus for the change from a Saladoid to an Oстionoid way of life.

While the early Ostiones ceramics on the western part of the island gradually evolve into the classic late Ostiones plastic modelled and mused wares with zoomorphic designs, the Monserratean pattern gives way in the east to another of Rouse's major styles - the Santa Elena, named for the north coast site near Toa Baja. These Elenoid wares, which are generally coarser and cruder seem to have developed in the Virgin Islands and then spread to eastern Puerto Rico sometime after 900 BC.

Because of the style's limited distribution in Puerto Rico, Rouse believed it to have diffused from the Virgin Islands where it presumably had developed independently from a Saladoid base. On the other hand, Vescelius (n.d.) sees the appearance of these Elenoid traits as signalling the beginning of Carib incursions into the eastern Antilles. According to

Vescelius between AD 900 and 1100, all hell broke loose all over the eastern Caribbean area. I suspect that it was at this time that the Carib began making their inroads. Their movements may have been triggered by certain subtle climatic changes. Changes were certainly occurring, climatically, at this time up in the North Atlantic area, and corresponding developments could have taken place down in the tropics as well. (Cf, too, the "fall" of the Classic Maya civilization!) Be that as it may, a lot of cultural change was underway, and as far as the eastern Antilles are concerned it seems to have involved actual population movements rather than simple internal developments or mere diffusion from one existing community to another.

It should be emphasized, however, that Allaire (1977) rejects the notion of a Carib infiltration in the lesser Antilles, especially at such an early date. At any rate, the appearance of the Elenoid pattern must, for the time being, remain a mystery.

In summary, this transitional period is one of temporal as well as spatial differentiation. In the western part of Puerto Rico the late Cuevan cultures are transformed through a process of simplification and later revitalization into the classic late Ostiones cultures while in the east the Monserratean patterns give way to the Elenan in what may be assumed as a simplification and reduction of the late Cuevan pattern under the strong influences coming from the Virgin Islands.

Although at first glance the overall picture is one of "breakdown" as Willey puts it (Willey 1965: 383), it should be emphasized that the ongoing reduction is one which manifests itself only with respect to ceramic wares. In particular, the late Ostiones period in western Puerto Rico is very clearly a time of cultural florescence. There is an increase and expansion in population, a noticeable increase in stone working technology, and Zemis or three pointed stone "idols" make their initial appearance. The most remarkable indication of the new lifestyle is the construction of stoneworks, ball courts and other "public works" at a number of major sites.

The Tibes site in Ponce is perhaps the most outstanding example of this new kind of site, which according to Willey "heralds a major element in the rise of West Indian ceremonialism." (Willey 1965: 384.)

The Centro Ceremonial Indigena at Tibes, Ponce, Puerto Rico, was located during an archeological survey of the southern region of the island by the Sociedad Guaynia de Arqueologia e Historia sponsored by the Puerto Rico Institute of Culture.

The site is located north of the City of Ponce on a flat rectangular terrace of the Portugues River, and is surrounded by hills. The area was under cultivation at one time but at the time of discovery it was heavily covered with brush, grass, and trees. Clearing revealed a number of shell middens, as well as the major features of the site which were carefully laid out stone constructions traditionally referred to as ball courts.

A total of seven ball courts and a quadrangular plaza are distributed throughout the site. Five of the ball courts are rectangular, consisting of two parallel lines of flat stones and open at both ends. The remaining two ball courts are U-shaped, bounded on each side by a walk paved with flat river cobbles and boulders. Another major feature of the site is a series of triangular stone arrangements surrounding a flat excavated area. The main feature of the site is the nearly quadrangular enclosure which has been called a plaza. It is bounded on two sides by a walk paved with flat stones while the other two sides are defined with flat slabs. Many of the stones surrounding the plaza bear petroglyphs. It should be noted that the terrain within the ball courts and plaza has been artificially modified. Several burials with religious offerings have been found within the enclosures and the fill material in the paved walks contains pottery, shells, and smaller stones.

Several shell middens are scattered irregularly throughout the site and in some instances the ball courts intrude into them, indicating that the site was occupied for an extended period of time with a gradual evolution into a ceremonial center.

A number of test pits have been excavated to establish an absolute and relative chronology as well as to define the potential for the site. These indicate that the site was originally occupied by Saladoid peoples. Radio-carbon dates and pottery analyses have revealed a continuous period of occupation between AD 400 and AD 1000, and for this reason it is a crucial site in that it brackets the significant Saladoid/Ostionoid transition.

The Centro Ceremonial Indigena at Tibes is one of the largest and most significant sites in the Caribbean islands, and is the largest ceremonial site in Puerto Rico of this period. The continuous occupation from Saladoid to Ostionoid times, the presence of the large stone constructions, the presence of shell middens and stratified deposits, all afford an opportunity to investigate some of the major substantive and theoretical problems in Caribbean archeology. Besides lending itself to the traditional problems of culture history and chronology, the site provides the ideal setting for the study of the cultural processes responsible for the transition from Saladoid to Ostionoid cultural manifestation. There has been some controversy in the literature as to whether there was a direct unilinear, *in situ*, transition from one to the other or whether the two manifestations actually represent two different groups. The data at this site can contribute significantly to the resolution of this research problem, as well as to other basic questions pertaining to the changes in sociopolitical organization which may have gone along with the changes evidenced in the material culture.

The Chicoid Experience

Sometime towards the close of the first millennium AD a number of new influences begin to appear in the archeological record of the Greater Antilles. This is a time when peoples and/or ideas of the Barrancoid Tradition - a mainland tradition in which modelling and incision reach their greatest expression in ceramics - begin to make their appearance in the Greater Antillean arc. These influences or actual incursions had been experienced earlier in the millennium in Trinidad as manifested by the Erin phase. It is also at this time that the late Ostionoid manifestation in Puerto Rico and

the Dominican Republic, under presumably external influences, begin to cohere into what will ultimately climax as the Chicoid tradition or series, representing the way of life of the Taino Indians at the time of contact.

Ostionoid ideas (and possibly peoples) had earlier spread westward into the Dominican Republic and Haiti and it was in eastern Hispaniola where this new cultural florescence assumed its greatest flamboyance. It is almost as if the center of activity, or influence which in late Ostiones times had its locus in western Puerto Rico flip-flops across Mona Passage and Dominican ideas, styles, etc., become predominant. As has been suggested above, the spark for this development may have come from mainland Barrancoid peoples. Vescelius (n.d.) suggests that a possible mechanism may have been 'an actual invasion by a small number of mainlanders,' and that a number of sites in which the Chicoid style is most prominent as, for example, the Cayito site in southern Puerto Rico, may actually represent the establishment of 'some sort of Chicoid port of trade.' Carbone (1979) has also suggested that the shift in the center of influence may be tied in to subtle climatic shifts which affected productivity differently in the two islands, with Puerto Rican populations becoming somewhat dependent on Dominican production.

During this late prehistoric period ceramic styles in Puerto Rico continue the diversification which developed in the intermediate period. Three major styles are recognized by Rouse for this period - the Boca Chica style, the hallmark of the Chicoid series, is named after the type site of Boca Chica in the eastern Dominican Republic and is recognized in Puerto Rico mainly at the Cayito site, near Santa Isabel; the Capa style which predominates in western Puerto Rico and the mountainous interior and finally the Esperanza style of eastern Puerto Rico which seems to represent the continuation of the Elenoid way of doing things.

Notable attributes of the ceramics during this period included broadline incision primarily on the shoulders and rims as well as a marked trend towards closed inturned rims and cazuela type bowls in contrast to the open boat shaped and flaring bowls of the earlier periods.

This late prehistoric period represents the cultural climax of the Greater Antilles, and these Chicoid manifestations can confidently be associated with the historic period Tainos who inhabited most of the large islands at the time of contact. As such, the Taino were the main representatives of Willey's Caribbean cultural tradition. A brief ethnography of the Taino is provided by Anderson-Cordova in a subsequent section of this report. Taino life is represented in the archeological record by a highly elaborate cultural assemblage whose most impressive manufactures were in stone and wood. Stone artifacts in particular survive in large amounts and attest to a highly developed sculptural tradition whose inspiration derived from a religious or ceremonial esthetic sensibility. These stone objects include the symbolic or ritual three pointed stones or Zemis and the 'elbow stones' and stone 'collars' presumably associated with the ball game. Other artifacts and ritual paraphenalia include wooden snuff tubes and bone and wooden spatulas used to induce vomiting during hallucinatory celebrations, wooden idols, and stools (dujos) of various anthropomorphic forms, and an extensive ornamental industry including beads, pendants, earplugs and other bodily ornaments made out of stone, shell, bone, and ceramic. There are a large number of these late period sites in Puerto Rico and they generally have two major features - refuse middens scattered about the sites some with shell, some without, along with the presence of one or more stone enclosures or ball courts, or stone lined plazas suggesting formal village plans. It is assumed that the larger sites represented the seat of power of local caciques.

The Capa Site in the mountainous interior section of Utuado is perhaps the most famous of these sites. It is one of the largest sites on the island and it has been studied systematically since 1915. The site has been developed by the Commonwealth government into a park and museum complex. The features of the site are described by Mason (1941) as follows:

- A. A great, nearly square court, or plaza, evidently the principal feature of the plan, levelled by excavation and bounded on two sides by a walk or pavement, on one by a line of limestone slabs and on the other by a line of igneous boulders.
- B. A long, roughly oblong levelled court, lined on the sides by limestone slabs and bounded on the ends by lines of small river stones.
- C. An elevated oval space adjoining the northwest corner of the main plaza A and surrounded by limestone slabs.
- D. An oblong space adjoining the oval and the main plaza, bounded by the western line of the main plaza, the southern section of the oval and the eastern boundary of the court E.
- E. A small court parallel with the space D and immediately west of it.
- F. A large mound of earth situated in the angle between the oblong court B, the oval space C, and the structure G.
- G. A rectangular structure of unusual plan running from the mound F to the western courts H and I.
- H. An oblong court artificially levelled with lines of river stones on the sides, the ends open.
- I. An oblong court nearly parallel to court H and similar to it in form, to the south of the latter.
- J. A smaller court bounded on the long sides with lines of river stones, situated on the northeastern periphery of the site, near the edge of the ravine and within the trees.

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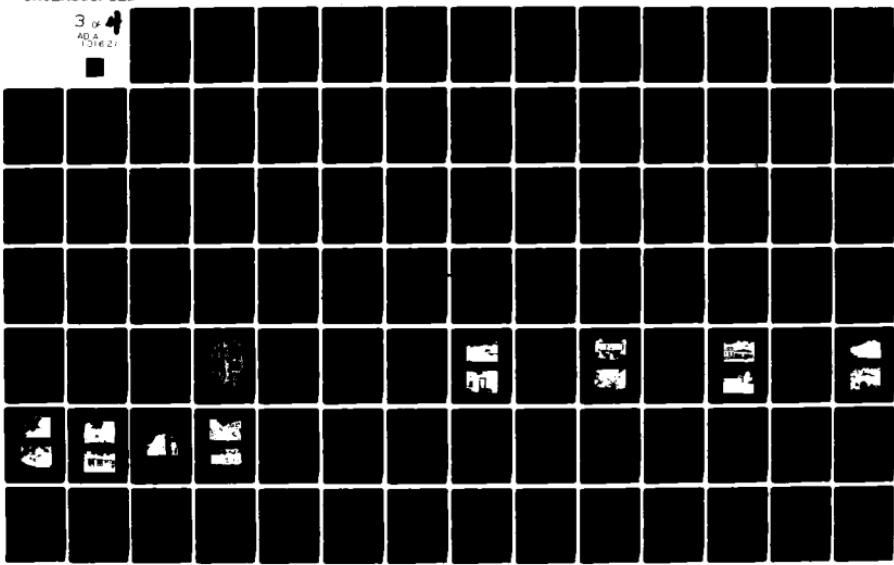
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K. An oblong court near the southeastern edge of the site, bounded on the sides by lines of river stones.

L. A line of stones northeast of the latter, possibly one side of another court.

M. Two parallel lines of stones situated at the southern end of the site on the edge of the woods.

Many of the stone slabs lining the ball courts had petroglyphs on them.

Three major ceramic styles are in evidence during this late prehistoric period on the island - the Boca Chica, the Capa and the Esperanza. All of these are incorporated under the Chicoid series whose major attributes are modeling and incision.

While it is generally assumed that the Capa style which is characteristics of the Taino Site was a direct outgrowth from Ostiones pottery under the influence of chicoid stylistics, the relationships of the Esperanza style are not quite so clear. Rouse concluded that the Esperanza style, which is named after a type site on the island of Vieques, represents a similar evolution of Elenoid wares again under Chicoid influence. Others (e.g. Vescelius) believe that the Esperanzan wares represent the continued Carib influence in the eastern Antilles.

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APPENDIX B

ETHNOHISTORY AND HISTORY OF PUERTO RICO
BY
KAREN ANDERSON CORDOVA

ETHNOHISTORY AND HISTORY
OF PUERTO RICO

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ETHNOHISTORY AND HISTORY
OF PUERTO RICO

ETHNOGRAPHY

Introduction

At the time of the Spanish conquest, the Indians who inhabited the greater Antilles were primarily a sedentary, agricultural people known as the Arawaks, whose tribal affiliations can be traced to northeastern South America¹. The Spanish called these Indians Taino, a term that still remains in the literature.

The aboriginal population of the Antilles also included the Ciboneyes², Ciguayos³, and Caribs. Concerning Puerto Rico, most historical sources indicate that it was inhabited by Taino, although suffering from frequent Carib attacks.

The Carib Indians inhabited the Lesser Antilles and the Virgin Islands and are believed to have migrated from the Guianas into the Antilles during late prehistoric times. The early historic literature describes them as a warlike, anthropophagous people who were expanding towards the Greater Antilles and encroaching upon Tainan territory in eastern Puerto Rico.

¹See prehistoric section for discussion.

²The term Ciboney was used to identify the aceramic, nonagricultural peoples that inhabited western Cuba and southwestern Haiti at the time of contact.

³The Ciguayo were a group of Indians who inhabited the northwestern part of Dominican Republic who were said to speak a different language from the Tainos.

Much has been written about the existence of Caribs in Puerto Rico at the time of contact, and of the validity of using the term "Carib" to categorize the Indians of the Lesser Antilles, as opposed to the "more peaceful" Tainos⁴. A discussion of this problem is beyond the scope of this report. Here, the ethnography of Puerto Rico shall be discussed as a whole, and should be taken as referring basically to the Taino Indians.

Sources

Most of the primary ethnohistorical sources deal with the Indians of Hispaniola. Hispaniola was the first island to be conquered and colonized by the Spanish. It was the center from which later colonizing expeditions departed and where most of the earliest, and therefore more useful, observations of Indian customs were recorded. Because of this, and because of the fact that most sources stress the cultural similarity between the Taino Indians of Hispaniola and Puerto Rico, most investigators have relied on the sources for Hispaniola, assuming that the information provided applies to Puerto Rico as well.

The most important primary sources for the ethnohistory of the Greater Antilles are: (1) Fernandex de Oviedo, (2) Fray Bartolome de las Casas, (3) Christopher Columbus' letters describing the islands and their inhabitants, and (4) Fray Ramon Pane. Pane, who has been called the first ethnographer of America, recorded the myths of the Indians of Hispaniola as related to him by Cacique Guarionex⁵. (Loven 1935:560.)

Martir de Angleria and Lopez de Gomara are also important sources. Since they never traveled to the New World, their accounts are not based on actual observation. Nevertheless, they have written summaries based on firsthand accounts.

⁴See, for example, Sued Badillo.

⁵See Loven, 1935, pp. 656-660, for discussion of the main sources.

Researchers of Caribbean ethnography have written numerous ethnographic syntheses based on interpretation of the primary sources. Coll y Toste (1907, in Rouse, 1952), Fewkes (1970), Stahl (1889), and de Hostos (1938), among others, have done so for Puerto Rico. Another very important secondary source is Loven's The Origins of Tainan Culture (1935), which has become a classic in ethnographic literature for the Caribbean. The data summarized here is taken from Loven and to a lesser extent, from Fewkes (1970), de Hostos (1928) and Rouse (1948, 1952).

Population

No adequate estimates for the contact Indian population of Puerto Rico are available. Early estimates are impressionistic and inflated, while later estimates are based mainly on calculating the Indian population during historic times and extrapolating back to calculate the population at the time of the contact⁶.

The following are examples of some of the estimates given for Puerto Rico:

Abbad y Lasierra	- 600,000	(Based on Las Casas)
Las Casas	- 600,000	
Brau	- 50,000	
Alegria	- 70,000	
Fewkes	- 30,000	
Cassa	- 50,000	
Tio	- 125,000	
de Hostos	- 200,000	
F. Mendex	- 80,000	
Coll y Toste	- 60,000	

Comparing these figures with Kroeber's (1963:166) estimate of 200,000 for the West Indies as a whole, Fewke's figure of 30,000 for Puerto Rico appears to be the most reasonable.

⁶See e.g. R. Cassa (n.d.) in which he discusses the problems of computing population figures for pre-Columbian Hispaniola.

Social and Political Organization

At the time of contact, the Indians of Puerto Rico were settled in villages throughout the entire island, e.g., in mountain valleys, coastal areas, and along the main river valleys. Historical sources indicate that Puerto Rico was divided into a series of cacicazgos or chiefdoms of varying size and importance. It is probable that each village clan had a leader or chief. A chief of a large, prosperous village may have exercised authority over minor village chiefs in a particular geographic area. Those larger divisions were described as cacicazgos by the Spanish. In Puerto Rico, for example, Agueybana, a cacique who resided in the southwest and with whom first contact was made by the Spanish, seemed to have had authority over an area comprising more than one local village.

The Spanish described the Taino caciques as hereditary chiefs who exercised authority over a particular village or group of villages and represented their people in dealings with the colonizers. In general terms, the Taino sociopolitical organization consisted of a series of tribal chiefs organized into loosely knit chiefdoms which could merge into larger confederations for specific reasons such as warfare, for example.

Historical information stressing the political and religious authority of the caciques, the availability of a stable food supply, the indications that these islands were densely populated, the development of a class of artisans and of "nobles" or "nitätinos" within the Taino social structure, plus the evidence for the beginnings of irrigation in areas such as Xaragua, Hispaniola, indicate that Taino society was probably in transition between the egalitarian society characteristic of the tropical forest people and the social division of labor and subsequent centralization of power characteristic of higher cultures, i.e., civilization. The degree to which this was occurring, and the probability that it was an uneven development concentrating in southeastern Hispaniola and southwestern Puerto Rico, is a matter of debate among many historians, anthropologists and archeologists. Nevertheless, the evidence tends to corroborate the assumption that Taino society was experiencing the beginning of social differentiation and that this development was cut short by the Spanish conquest. The origins of this

development can be inferred from the archeological record, probably going back to Saladoid times.⁷

Evidence as to the names and geographical locations of the Puerto Rican chiefdoms is contradictory at best. Coll y Toste (1907, in Rouse 1952) mentions 18 cacicazgos for the island. Rouse (1952) illustrates the location of these in Figure 2, p. 469. Fewkes (1970) mentions six chiefdoms as being the most important, those of the caciques Agueybana, Aymamon, Loiza, Urayoan, Guarionex and Mabodamaca. It is probable that the chiefdom boundaries were flexible, and as was mentioned above, the preponderance of one cacique over many others was probably manifested only in circumstances of particular need, such as armed conflict. If the Carib raids to the island were as frequent as the sources indicate, the territorial composition of the Taino chiefdoms of eastern Puerto Rico may have been affected.

Settlements

Not much is known about late prehistoric settlement patterns in Puerto Rico, except for general information based largely on historical descriptions. Settlements varied from single dwellings to villages with as many as 1,000 houses (Rouse 1952:532-39). Most of the Taino villages had one or more ball courts or plazas. These are flat, rectangular areas lined with embankments and sometimes also with flat stone slabs (Rouse 1952, p. 232-39, Mason 1941). These ball courts or plazas served as centers for areitos (folk dances) and religious ceremonies.

Sources indicate that the chief's house was usually located at one end of the ball court, where he resided with all his wives. The chief's dwelling was larger than the others, and sometimes another structure was erected to house the cemis (idols) that were in the chief's possession.

Fewkes (1970:42) quotes the following description of Agueybana's village in southwestern Puerto Rico as reported by Columbus in 1493:⁸

⁷Refer to the prehistory section of this report.

⁸Quote taken from J. Bautista Munoz, 1793, Historia del Nuevo Mundo.

"The houses composing this pueblo were arranged about a central inclosure or plaza, from which there extended to the shore a double row of palisades inclosing a passageway covered with boughs and ending in an elevated lookout near the seashore. This latter structure was larger and higher than the other houses and apparently circular in form."

On the basis of archeological observations and historical research, Fewkes infers the following concerning the distribution of structures within a Taino village (1970:42):

"Clusters of mounds are found in the neighborhoods of the enclosures, surrounded by standing stones, called juegos de bola, or ball courts, remains of many of which are still found in the interior of the island. These mounds may have been sites of houses arranged about the inclosures, and there may have been a central structure larger than and in form different from the smaller dwellings clustered about it. If this were true, each of the smaller cabins in these clusters was probably peopled by one clan or phratry, and the larger central house served as the temple where the idols and ceremonial objects were kept, and where the head of the clan, called the cacique, resided. There is good evidence that in every pueblo one house, different from the rest, was always set apart for religious purposes, and in this house idols and other paraphernalia of worship were always kept."

"The other houses were habitations of the people, and were apparently of two forms, circular and rectangular."

This bring up the topic of house types. Loven (1935:339) is of the opinion that during precontact times, the tainos had only round houses. He believes that the development of rectangular dwellings during the historic period was the result of European influence (Loven 1935:342). He bases his argument on the fact that neither Columbus nor Las Casas mention rectangular houses. It is only Oviedo who does so. Loven argues that since Oviedos' observations were done after the 1540's, when the repartimiento system had been annulled

and the few remaining Indians were living in towns set up by the Spanish, that this cannot be taken as evidence for the original house types.

Subsistence

Agriculture was the main subsistence activity of the Taino Indians, although it is not possible to establish the percentage of subsistence acquired by agriculture, as opposed to the other subsistence activities such as fishing or hunting (Sturtevant, 1961:61).

Bitter manioc was the most important cultigen. Early descriptions emphasize the extensive manioc fields planted in the rich alluvial soils along the main river valleys. Manioc, as well as batatas (sweet potatoes) and ages were cultivated in "montones" or earth-heaps, following the burning or clearing of the land. They were planted by sets, since with the long period of domestication the plants had lost the ability to seed. At least 6 varieties of manioc were cultivated in Hispaniola (Loven, 1935:358, from Oviedo, Historia, Vol. I. p., 271). Las Casas describes the planting of yuca (manioc) as follows:

"Hacian los indios unos montones de tierra, levantados una vara y media y que tenian en contorno 9 o 12 pies, el uno apartado del otro dos o tres pies, todos por su orden rengleras de mill y dos mill y diez mill de luengo, y otras tantas de anchura, segun la cantidad que determinaban poner; hechos los montones tomaban la planta----y hacen pedazos dellas de a palmo o poco mas de palmo, y hincan seis o ocho o nueve dellos las yemas hacia arriba, en la corona de cada monton, por su orden apartados uno de otro, a la manera de un alquerque con que entre nosotros se juega, con tres o cuatro rengleras, segun el monton es dentro todo en la tierra, salvo dos o tres dedos que dejan fuera; la cual postura en tiempo que no llueve, sino que en polvo esta la tierra, debe ser. Sobreveniendo despues las aguas, prenden aquellos pedazos que de palmo fueron puestos, y de cada yema de las que quedaron fuera de la tierra, se produce su ramilla."

The Indians made dirt piles rising to about a vara and a half (about 108cm) and with contours of 9 to 12 feet. Two to three feet apart from one another and all in order of one thousand, two thousand and ten thousand in length and so many more in width according to the amount they were setting out.

Once the piles were made, they took the plant--breaking it in pieces of about the length of a hand or a bit longer--and they would drive it into the crown of each pile making groups of six, eight, or nine to each pile, buds up, apart from one another as an alquerque that is played among ourselves, with three or four rows of rings, depending upon the amount of dirt in the pile, all in but two or three fingers (width of index, middle and ring fingers) out this position for the time the dirt is dry and it does not rain. Once they survive the waters (the rainy season) and take those pieces of palmo size, which were set out and left out of the dirt, branches out.

(Translation by Ana Burgamy)

This description refers to the cultivation in rich, valley areas, not in the hills. In the latter, yuca was planted by the slash and burn technique, without the use of "montones," since this technique is obviously useless on sloping ground.

Las Casas' description also points out the advantages of the "montones" technique. Since planting was done before the rains, the heaping up of the earth effectively loosened the dry earth. Furthermore, it permitted the better aeration of the soil when the rains came, and the maintenance of humidity during the drier months. The ashes resulting from the clearing and burning of vegetation could be more efficiently used as fertilizers by the technique of piling them up into the montones. Yuca was a perennial plant, which preserved well and could be left in the ground and harvested anytime between 6 to 10 months to 2 years after planting.

The manioc tubers were harvested and made into a hard, flat bread known as cassava. In order to do this, it was first necessary to eliminate the poisonous juice characteristic of bitter manioc. The basic techniques and

materials used for this purpose have been extensively described by the early chroniclers and are still in use by modern South American tropical forest tribes.

Briefly, the procedure consisted of (1) grating the tubers by means of a wooden board encased with flint or wooden chips, or by shark skins, (2) pressing the pulp through a woven instrument called the cibucan in order to extract the juice, (3) collecting the flour and passing it through a sieve, (4) kneading the dough and forming it into flat, thin, circular cakes set to dry and baked over large circular griddles.

Maize was also cultivated by the Tainos, but unlike western South America and Mesoamerica, it was not a staple. The Tainos cultivated it by the slash and burn method, and did not utilize the montones technique. They harvested it unmatured and used it as a vegetable or in soups.

Other important root crops were the yahutia and the arrow root or liren, both also cultivated by means of sets.

Tobacco was another native cultigen of great importance. Its leaves were smoked in the form of cigars, and it is probable that the term "tabaco" originally meant "cigar" and not the plant itself. It was also ground into powder and used as snuff. The inhalation of snuff by means of forked tubes made of bone or wood was associated with an important religious rite known as cohoba. In this rite the caciques or medicine men (behiques) fasted and hallucinated under the effects of the snuff. It was a means of communicating with the cemis (also spelled zemis) or idols which constituted the central aspect of Taino religion. The content of the snuff has been a subject of controversy for years but it is probable that tobacco was an important element. The use of the seed of the piptadenia peregrina tree (a known powerful hallucinogenic) in the cohoba rite is also possible. Loven (1935) believes that tobacco was the only ingredient in the snuff, but both tobacco and piptadenia peregrina were probably used.

Other important cultigens were peanuts, beans, aji (pepper), cotton, henequen (hemp), and maguey. Among the native fruits mentioned in the sources are jobo, guava, guanabana or soursop, mamey, papaya, tuna, pitahaya, and pineapple. Calabashes were made from gourds harvested from the higuero trees, and woods such as guayacan, caoba, ceiba, maria and cigua carbana (Loven, 1935:411) were also utilized.

Fishing was another important subsistence activity and the Tainos relied on it for their main source of animal protein. A variety of procurement techniques were employed. These are summarized by Loven as follows (1935:423-431): (1) direct catch (molluscs, mussels, turtles), (2) fish poisoning (river fishing), (3) shooting fish with many-pronged fish spears or arrows, (4) use of harpoons for catching manatees, (5) with remora and line (only documented for Cuba), (6) with hook and line, (7) with fish weirs for use in tidal waters, (8) with baskets for fishing in rivers, (9) with nets made of cotton or palm fiber, and stone sinkers. Corrals for keeping fish such as lizas (Myete roperca) (Loven 1935:421) are also historically documented.

Compared to fishing, hunting did not constitute an important nor efficient subsistence practice. Hunting techniques were primitive (Loven 1936:431). Hutias (small rodents which lived mainly in savannah areas), iguanas, geese and parrots were the main animals hunted, since there were no large sized animals represented in the local island fauna.

Historical and archeological evidence tend to corroborate the sedentary nature of Taino communities. Many archeological sites represent long periods of occupation. It is probable that, given adequate weather conditions, with the technique of cultivation in montones and the availability of marine and river faunal resources, the Taino did not have to shift their villages every few years because of depletion of the soil. This may have varied, depending on local environmental conditions, but this is a topic for future research.

Religion and Mythology

The roots of Taino religious beliefs can be traced to their Arawakan cousins in the South American mainland. Important parallels exist between the Tainos and the mainland Arawaks with respect to mythological beliefs (Loven, 1935:561), the importance of shamanism and curing ceremonies (Loven, 1935:576) and the belief in spirits (Loven, 1935:573). This is especially true with the Arawaks of British Guiana.

Nevertheless, archeological data and historical accounts indicate that Taino religious beliefs had evolved independently from the mainland. Religious beliefs and ceremonies focused primarily around the cult of the cemi. It is difficult to conceptualize what the term cemi meant to the Tainos, but it seems to have been used to define certain powers or beliefs in supernatural beings. The concrete representations of these powers in the form of idols made of wood, cotton, bone, shell, clay and stone were also known as cemis. The cult can be compared with the priest-temple-idol cults developed in western South America. It appears that the importance of this cult was closely related to the development of strong chiefdoms. The more powerful caciques were the ones that owned more cemi idols, or the most powerful cemis. Even though most peoples kept small cemis at home, the principal cemis, e.g., the ones that had the power to prophesize future events, bring rain, regulate crops, improve hunting and fishing, produce wealth, etc., were under the control of the caciques and were worshiped in special structures or "temples."

The power to communicate with these cemis was a prerogative of the caciques and behiques (medicine men). The development of Taino art is clearly tied to the cemi cult. The use of anthropomorphic (usually consisting of encephalomorphic) representations of human beings with flexed legs and pronounced genitals), zoomorphic (form of turtles, lizards, frogs, birds, etc.,) vegetal, and geometric (3 pointed stones, stone collars, elbow stones) motifs as representatives of cemis in a large variety of artifacts was widespread. The cemi motif was represented in ceramics, idols made of various materials amulets, body painting (Fewkes 1970), petroglyphs, etc.

Each cemi had its own name, story to explain its origin, personality and powers (Rouse 1952:536). Skulls and bones of deceased relatives were believed to be cemis and were kept in baskets hung under the dwellings. This custom was observed by Columbus, and is also present in Pane's description of Taino mythology.

A complex of artifacts formed part of the religious paraphernalia associated with cemiism. The cult revolved around the use of offerings of food to the idols and the submergence into a hallucinogenic state preceded by fasting and ritual vomiting in which state the caciques and/or behiques were able to communicate with the cemis. The cohoba ritual was a religious ceremony carried out exclusively for communication with the cemis. The complex of elaborately carved artifacts such as the actual cemi idols (See Arrom for illustrations), vomiting sticks, wooden or ceramic receptacles for placing snuff and food, forked tubes, duhos, personal amulets or ornaments can be associated with the cohoba-cemi cult.

Taino beliefs concerning the cause and subsequent cure of disease are also related to the cemi cult. Most maladies were believed to have been caused by cemis as a means of punishment for improper care in maintaining them, and could be cured if the sick person made an effort to provide for them correctly. The behique or shaman fasted, purged himself by vomiting, and snuffed cohoba before seeing a patient. Pane describes the curing procedure in great detail. In summary, the medicine man proceeded to touch the patient in various parts of the body, sucking and making various faces, until he extracted a foreign body from the patient. This usually consisted of a bone or stone object which was believed to have been planted in the patient's body by a cemi, and was the cause of illness. The behique then advised the patient on how to take care of his cemi to avoid future illness.

With respect to Taino mythology, the only documentation available is Fray Ramon Pane's account of the beliefs related to him by Chief Guarionex, from Hispaniola.

The Tainos believed in a supreme being called Yocahu Vaqua Maorocoti, who was not a creator god. He was believed to reside in the sky, but was not an object of worship. Some researchers of Tainan mythology believe him to be related to the culture plant manioc, called Yuca by the Indians. He might have been viewed by the Taino as the original bestower of the plant (Loven, 1935:563). He was said to have had a mother who had five names.

If the Tainos had any mythical conceptions concerning the origin of the earth, we are not aware of them. With respect to the creation of man, the Tainos believed that men came out of two caves. These were located in Hispaniola and were named Cacibagiuagua and Amaiauba (Loven, 1935:565). The sun and the moon were also believed to have come out of caves, prior to the emergence of man. Pane relates that the cave from which mankind emerged was guarded by a man called Marocael, but that some people escaped and were surprised by the sun and turned into trees, stones and birds. The women emerged from the cave before the men and left for an island called Matinino accompanied by a man called Guagugiona. The men who were left in the cave finally went outside, but had no women. Looking at the trees, they found some slippery beings which escaped their grasp and which were finally caught by a man called Caracaracol, whose hands were rough and scaly. Since these beings were sexless, a woodpecker by pecking an opening in their bodies, transformed them into women.

Other myths related by Pane concern the origin of specific cemis, the manner in which they were fashioned, the names of powerful cemis and the caciques who possessed them, etc. The account of the creation of the sea, summarized below by Fewkes (1970:73-4) is a good example of the parallels between Taino and South American Arawak beliefs (Loven, 1935:570).

"There was once a man named Yaya or Giaia, whose son, called Yayael or Giaiel (earth) sought to kill his father and was banished to a place where he remained four months, after which his father killed him, and put him into a calabash, which he hung to the roof of his cabin, where it remained a long time. Yaya went one day to see his son's bones, and having taken down the calabash and opened it, found instead a multitude of fishes, great and

small, into which the bones had changed. Yaya and his wife decided to eat these fishes, but one day, when Yaya had gone to his farm, there came to his house the four men of Itaba-Yanuba (Itiba Tahuvaca), who died at their birth. The first-born was called Caracol, "shell", the other had no names. These four sons of Itiba-Tahuvava, having examined the calabash, resolved to eat the fishes. As they set about they were suddenly surprised by the return of Yaya and attempted to hang up the calabash again, but it fell to the earth and was broken. All the water poured out, covering the earth and forming the sea, carrying with it the fishes, which became its inhabitants."

ETHNOHISTORY

Introduction

It is a well-known and often repeated fact that the major result of the Spanish-Indian contact during the conquest and colonization of the Greater Antilles was the rapid decimation of the aboriginal inhabitants. These islands were the scenario in which the first contacts between the Spanish colonizers and the Indians of the New World occurred, and it is here that the first Spanish experiments to control and utilize Indian labor took place. One of the most important consequences of this experiment was the destruction of the aboriginal cultural system.

The rate in which this occurred varied from island to island. Hispaniola was the first one to be colonized, and its aboriginal population was practically nonexistent by the middle of the XVIth century. Nevertheless, archeological and historical studies of the culture-contact period are still possible. The early Spanish City of Vega Real, located in the Central Cibao Valley had an Indian population which resided in the town and was utilized by the Spanish to work in the gold mines of this area.

Puerto Rico was the second island to be colonized, and by the end of XVIth century there was a minimal number of Indians remaining on the island. No historic aboriginal sites have been located, although sources mention their

existence, especially in the mountainous interior of the island and in the southern coastal areas.⁹ (Brau, 1969:160, 478-79).

Despite the brief period of survival, the Indian population played an important role in the early historical development of Puerto Rico. Their utilization as laborers in the gold mines of the Sibuco, Loiza and Anasco Rivers formed the basis for the initial economy of the island. They also provided food for the Spanish. Manioc, the Indian's staple, became a very important food source for the Spanish and has continued to be an important crop up to the present. Indian labor was important in the experiments with newly introduced crops such as plantains, coconuts, sugar cane, citrus trees, etc. These were carried out in the Royal Farm (Granja Real) located in the Toa River Valley. Furthermore, the Indians' persistence in rebelling against their conquerors limited Spanish settlement of the island, and effectively thwarted Spanish attempts to settle in the eastern coastal area.

Most people would agree that forced labor was one of the most important reasons for the quick demise of the Caribbean Indians. The Spanish instituted three main systems of forced labor: (1) the encomienda, (2) the repartimiento, and (3) slavery. The encomienda was a grant given to individual settlers which authorized them to exact tribute from a particular group of Indians. These Indian groups usually consisted of a cacique and his subjects.¹⁰ The repartimiento system consisted of the distribution of Indians among various settlers for the purpose of utilizing their labor. In exchange, the owner was supposed to care for the Indians' "material, and spiritual well-being" (Steward, 1956:40). In both cases, the Indians were technically free. In theory, the encomiendas and repartimientos were envisioned as a means of combining the utilization of Indian labor (needed for the extraction of gold), with their indoctrination into the Catholic faith and their integration into the colonial economy. In practice though,

⁹ See below for discussion.

¹⁰ e.g. The Cacique Aquebana and his subjects who lived in a village close to the Guarabo River (now known as the Anasco River) were granted to Sotomayor.

the system hastened the demise of the Indians. The persistent, hard labor at the mines weakened the Indian population. By keeping the Indians at the centers of gold extraction, the Spanish disrupted their village life, separated the men from the women and removed them from their land, thereby impairing their agricultural activities. This undermined the aboriginal social and cultural system. Las Casas points out that one of the reasons for the decline in Indian population was the periods of famine which were due to the decreasing yields in agricultural production. If 8 to 10 months of a year were spent in the mines, that would have an obvious effect on agricultural practices, especially when it is taken into account that the men played an important role in agriculture.

All these factors increased the natives' susceptibility to European diseases, another frequent cause of death.¹¹

Although enslavement of Indians was originally prohibited by the Spanish Crown, the frequent outbreaks of rebellion and the raids against Spanish settlements by Carib Indians from the Lesser Antilles resulted in a change of policy. Indian slavery was condoned in the case of rebellion. In Puerto Rico, this policy resulted in the enslavement of many Indians, including native Indians as well as Indians from Guadeloupe, Dominica, Cumana, and Santa Cruz (Brau, 1969).¹²

Another factor that contributed to the depletion of the island Indian population was their steady abandonment of the island in a effort to flee from slavery and forced labor. The Carib-Taino alliance against the Spanish, which began early in the history of Indian rebellion on the island

¹¹ In 1518-19, numerous sources attest that at least 1/3 of the Indian population of Hispaniola and Puerto Rico died in a smallpox epidemic.

¹² As will be explained below, the persistent attacks of Indians from the Lesser Antilles, allied with the rebelled Indians of P.R., sparked Spanish retaliatory raids in which many Indians were brought to Puerto Rico as prisoners, and consequently enslaved.

and persisted well into the sixteenth century, posed a serious problem for the Spanish because they frequently attacked Spanish settlements (this subject is fully discussed below).

Native Population

As was previously discussed the population of Puerto Rico at the time of contact was probably between 30,000 and 50,000.

The Spanish never carried out a census of the total native population of the island. Most of the figures available in the sources refer to the number of Indians distributed in repartimientos at a given time, or to the number of Indians that participated in a rebellion, or that were killed or taken prisoners. Although it is clear that the native peoples of Puerto Rico were rapidly decimated, it is difficult to calculate the rate of population decline on the basis of the sources available. In many cases, the Indians in repartimientos were under counted. Different census figures had different categories. For example, the 1509 repartimiento counted men and women, but not children (Brau, 1975; 158-59), while the 1514 repartimiento did not include the families of the caciques, the children under 14, nor the women married to Spaniards (Brau, 1969:241).

Another important problem in studying historic native demography is figuring out what Indians are being counted. It is possible that the early repartimiento of 1509 distributed only Indians native to Puerto Rico, and this may also be argued for the 1511 repartimiento. But all other sources of information concerning Indian population probably include both Puerto Rican Indians, plus many others that were brought in as slaves. This must be kept in mind. We are dealing now with Puerto Rico as a geographical area

in which an indefinite number of Indians continued to live during most of the sixteenth century, and not with the descendants of the native precolumbian inhabitants of the island. This population now included Indians from Puerto Rico, from other Antillean islands, and probably also from the South American mainland. The native cultural system was transformed not only because of the effect of Spanish colonial rule but also because of direct contact with natives from other islands. The Taino-Carib alliance which is suggested by the historical sources was one of the Indian responses to the situation imposed on them by the Spanish. Information concerning the social and cultural transformations that must have occurred during these years is not available at this time. Fugitive Indians, both those moving into the mountainous interior of Puerto Rico and into other islands, must have developed new social and cultural responses in order to adapt to their nomadic existence, while the pacified Indians who remained under Spanish control gradually became assimilated into the dominant Spanish culture.

Sources on Historic Indian Population

The first population count available for the historic period concerns the Indians given in repartimientos in 1509. As mentioned above, 5,000 men and 500 women were included. These figures refer to the entire island, but of course do not include the Indians living in the interior of the island and in the south and eastern areas, where the Spanish had not settled. Most of these repartimientos probably relate to the northeastern area of Puerto Rico, under the jurisdiction of the town of Caparra.

Another repartimiento was carried out in 1511-12, while the island was in the midst of an Indian rebellion. The total number of Indians recorded here was probably around 5,150. The number of Indians given to one particular individual fluctuated from a maximum of 500 for the Royal haciendas, to a minimum of 50 allotted to other settlers.¹³

¹³ See Fewkes; 1970:24 for a breakdown of where and to whom these Indians were distributed.

Early historical sources document the individuals to which repartimientos were granted as well as the geographical location of some of these. This time of information could provide clues for the present location of these areas and the discovery of early historical-archeological remains.

In 1515 another repartimiento was carried out, this one by Sancho Velazquez. The number of Indians counted in this case varies from Coll y Tostes (1923:171) count of 4,000 to Brau's (1969) 5,150.

In 1530, Governor Landa's report to the King mentions 473 male and female Indians under the encomienda system and 675 male Indian slaves for a total of 1,148 Indians (Brau, 1969:389). As was discussed above, these figures do not include the Indians working in the Royal haciendas nor those still fugitive in the hills. Besides indicating a substantial decrease in Indian population from 5,100 in 1515 to 1,148 in 1530, these figures provide a clue to the existence of a large proportion of Indian slaves on the island, as opposed to the "free" Indians who were subjected to the encomiendas.

Area of Settlement

During the first years of the colonization of Puerto Rico, the Spanish population was concentrated in the town of Caparra and surrounding areas. Rural estancias were located in the Cibuco and the river valleys, as well as in the Cayrabon or Loiza River, where there had originally been an Indian settlement. Another town was initially established in the area now known as Guanica, but it was later transferred further west close to the port of Aguada, and named the village of Sotomayor. Gold mines were located in this area. The Indian population here was also considerable. The Yagueca valley, drained by the Guaorabo River, was the seat of the chiefdom of the cacique Urayoan. The chiefdom of Agueybana who was considered one of the most important chiefs of the island, was located further east.

The Spanish tried to settle in the eastern region of the island, establishing the settlement of Dagua near what is now Humacao. This settlement was destroyed in 1513 by a Carib Indian attack (Brau, 1969:231).

There was also a small group of Spanish settlers who lived in the Arecibo area, and in the mountainous area known as Otuao.

Tangible evidence of historic Indian settlements is not available, although we do know that there were Indians working for the Spanish wherever they were located. Many of the Indians under the Cacique Caguas worked in the Toa Royal Farm (Hacienda Real del Toa) (Brau, 1969:337). The southern and eastern coasts continued to be inhabited by small groups of Indians, and the mountainous interior served as a refuge for the rebel Indians.

Indian Resistance and Open Rebellion to Spanish Rule

The earliest and most widespread Indian rebellion in Puerto Rico occurred in 1511, only three years after the colonization process began.

The focus of rebellion was located in southwestern and southern Puerto Rico, under the leadership of Cacique Agueybona II. Historical sources indicate that a meeting of the principal island chiefs was carried out in the village of Agueybona II in order to plan the attack. It was the Indians first attempt to free themselves from the encomiendas.

According to Brau, they planned to surprise the Spanish in their rural estancias southeast of the Villa de Sotomayor, and then burn the village. They then planned to proceed towards Caparra and complete the destruction of the Spanish. It is possible that the Indians believed that a major effort to eliminate the Spanish would allow them to return to their former independent life.

Sotomayor was killed while on his way to warn the settlers of Aguada, and the town was burned. The Indians had succeeded so far by relying on the surprise tactic, since they were aware of the Spanish superiority in arms.

The Spanish retaliated quickly. Juan Ponce de Leon utilized the same tactics, surprising the Indians in the town of Agueybana II while they were celebrating an areyo, probably as a celebration of the Aguada victory. 200 Indians were killed here, and many were taken prisoner and transported to Caparra (Brau, 1969:152).

The Indian rebellion did not end here, it spread from the southwest coast to the northwestern mountain regions, and even to areas close to Caparra, and also involved Indians from the island of Santa Cruz (Brau, 1969:159, 157).

Two other important battles were fought, one at Yagueca in which the Indians were defeated by Salazar and another in Coayuco, where Agueybana was killed (Brau, 1969:158).

After these two defeats and the death of Agueybana, the main rebel leader, sporadic fights continued. At least two caciques, Caguas from the Rio Turabo area, and Don Alonso from the northern sections of the Otuao, surrendered (Brau, 1969:160).

This defeat prompted many Indians to flee to the interior of the island, and towards the neighboring Virgin Islands and the Lesser Antilles. This exodus was enough to alarm the Spanish. In 1512 the crown ordered the destruction of the Indians' canoes so that they could not escape to other islands (Brau, 1969:170). Brau (1969:212) mentions how it continued to be Spanish policy to round up the rebelled Indians and destroy their canoes in order to break up their alliance with the Indians of Santa Cruz.

In the eastern sections of Puerto Rico, there were 3 caciques which were still in rebellion in 1514. These were the Cacique Luquillo, from the northeast sierra, plus the caciques of the Dagua and Humaeao River areas.

The Spanish found out about a joint attack planned by these three caciques and the Indians from the other Caribbean islands, and surprised them as they disembarked along the eastern coast. In this battle, Cacique Luquillo was killed, and the other two decided to surrender (Brau, 1969:254).

The period of insurrection continued, with most attacks now being led by Indians from outside Puerto Rico. The Spanish retaliated by sending out expeditions to Santa Cruz, Dominica and Guadalupe, setting fire to Indian villages, and bringing back prisoners to work as slaves in the Puerto Rican mines and estancias (Brau, 1969:298,448).

This situation continued sporadically. The following are accounts of Indian attacks on Spanish settlements in Puerto Rico:

1. 1514 - Indians from Vieques attacked Spanish estancias along the Cayrabon River (Brau, 1969:235).
2. 1520 - Five Indian canoes attacked the Spanish in their farms in Humacao (Brau, 1969:364).
3. 1520(?) - Indians from Dominica and Guadalupe attack the settlement of Aguada. They burned the town and destroyed the San Franciscan convent (Brau, 1969:385).
4. 1529 - Eight Indian war canoes came into the San Juan Bay near the area around the mouth of the Bayamon river (Brau, 1969:392).
5. 1530 - 11 war canoes disembarked close to the banks of the River, and attacked the dispersed farms in the area, taking with them 20 black slaves and 16 Indians.
6. 1564 - Caribs raided the Loiza River area (Fewkes, 1970:28).

As can be concluded from the above, the pacification of the island was not such an easy task for the Spanish. Even though the Indians were fighting a losing battle, they continued to oppose the Spanish. Even when most of the native residents of the island had already been pacified, the natives who fled to neighboring islands continued to raid the coastal settlements of Puerto Rico (especially along the southern and eastern coasts) with the help of their Carib allies. Many of the lesser islands suffered depopulation

prior to the establishment of European settlements. This was due in part to the Spanish retaliatory raids. As a result of these raids, many Carib Indians formed part of the historical Indian population in Puerto Rico.

After the sixteenth century, there is not much mention of the Indians of Puerto Rico. We know that in 1542, the encomienda system was finally abolished, although the Puerto Rican Indians did not actually regain their freedom until 1550 (Brau, 1969:473, 476). Most of the Indians settled in towns of their own in the mountainous interior (Rouse, 1952:470) and in the south and north coast areas of Arecibo (Brau, 1969:478).

None of these villages have been located archeologically, and historic evidence is fragmentary. Brau mentions the Indian town of Cibuco, located close to the town of Santa Maria de Guadianilla, in 1568 (Brau, 1969:479)¹⁴. Rouse (1952:470), says the following concerning these towns:

"Two others, without names, are said to have been located in the western part of the Cordillera Central as late as 1710 or 1720. In 1774, Bishop Manuel Jimenez Perez mentioned four Indian settlements in a report to the King: Casonay, Cumanacoa, Curaquiche, and Guaira. Presumably, these were located in the western part of the Cordillera Central..."

The existence of Indian towns during the eighteenth century is a possibility, judging from census figures indicating a population of 1,756 Indians in 1777; 2,302 in 1787, and 2,312 in 1797 (Brau, 1969:479).

This is the last mention of the Indian population in the historical sources. By this time, it is probable that many of those remaining Indians were already mixed with the Spanish and African population of the island. In the 1808 census no category for "Indian" is given quoting Brau (1969:479):

¹⁴ Original information from Lopez de Velasco, J., Geografia Universal de las Indias, 1849.

"Y vencida la resistencia a la fusion de razas y extendidos los cruzamientos, al practicarse el censo de 1808, el gobernador don Toribio Montes, para obviar confusiones, suprimio la calificacion de indios involucrandolos a todos, genuinos, mestizos y zambos, en la clasificacion de pardos libres."

Once the resistance to the mixing of the races was overcome, the Governor, Don Toribio Montes, cancelled the Indios classification which included genuinos (all Indian), mestizos (half Spanish and half Indian) and zambos (half Black and half Indian) and included them all under one classification, Pardos Libres or mulattos to avoid confusion during the 1808 census.

A thorough literature search for mention of the Indians during the historical times could possibly unearth new clues, and some of these Indian villages could be found, as has been the case in northeast Cuba. This discussion has pointed out that the Indians persisted in Puerto Rico longer than most people admit. Fewkes' (1970) statement concerning the existence of Indian descendants in the section of the island known as Las Indieras, located in the western mountainous interior east of Maricao, and in the Luquillo Massif located on the eastern side of the island, at the turn of the century is an interesting point.

This is entirely possible, since this is where they took refuge and where they most probably established their towns after being set free.

HISTORY

The following is a general overview of the history of Puerto Rico, based largely on Steward, 1956, the People of Puerto Rico unless otherwise noted.

Sixteenth and Seventeenth Centuries

We have already discussed the early part of this century in relationship to the history of the aboriginal population. The sixteenth century was

characterized by the rapid decline in the native population of the island, the establishment of two population centers, Caparra and Villa de Sotomayor de la Aguada, the dispersal of the Spanish population in estancias (farms) especially in the northeastern and southwestern sections of Puerto Rico, the frequent attacks by Carib Indians who fled from the island, and the beginning of contraband trade.

The white population of the sixteenth century, which consisted only of Spanish Catholics, was very sparse. The following table (Steward, 1956:36, Table I) summarizes the population figures available from the beginning of the colonization period to the middle of the seventeenth century:

YEAR	POPULATION	SOURCE
1511	100	Oviedo: 100 Spanish remained after the Indian rebellion
1515	350	Coll y Toste, 1914:266; 70 families or <u>vecinos</u> (x five)
1530	597	1530 census after Brau, 1904:70; 57 white men married to white women x five=205, plus 14 married to Indian women, plus 298 unmarried
1548	650	Coll y Toste, 1914; 150 vecinos
1571-74	1,400	Lopez de Velasco (1571):88-90; 200 vecinos in San Juan, 50 vecinos in San German, 30 in Arecibo
YEAR	POPULATION	SOURCE
1646	3,500	Coll y Toste, 1914:266; 700 vecinos

The main interest of the Spanish at the beginning of the colonial period was gold mining. Gold production was already declining by the 1520's (Brau, 1969:438). Other economic activities were considered and the Spanish Crown established incentives for the establishment of sugar ingenios (mills) mainly in the form of loans to settlers. The Royal Decree (1519) stated:

"La católica reina mi madre e yo tenemos mucha voluntad que la isla de San Juan se pueble y ennoblezca de todas las cosas de plantas e otras granjerías como lo son e estan estos reinos, y por ende yo vos mando que con mucha diligencia entendais en que los vecinos de la dicha isla hagan ingenios de azucar; e a los que tuvieran lugar para ello le favorezcais e ayudeis con todo lo posible, así en harcelles prestar de nuestra hacienda para ayudar a hacer los dichos ingenios, como en dalles libertades e de los provechos de la tierra, etc..." (Brau, 1969:459).

It is the Catholic Queen's, my mother's and my will that the island of San Juan be populated and planted like all the other farming lands belonging to this kingdom, and I urge you to encourage the people living there and have the room, to erect sugar mills, and for those who do not have a place to do so, give your help by lending them land from our hacienda estate to help them erect the mentioned sugar mills and also giving them freedom to enjoy the sharing of the land's bounty. (Translation Ana Burgamy)

Despite these incentives, the poverty of the population and the large initial costs of establishing sugar mills limited the development of the sugar industry. Although sugar production soared from 10,000 lbs. in 1535 to 450,000 lbs. in 1582 (Steward, 1956:38), towards the end of the century it had dropped to 25,000 lbs. The continuous Indian and pirate raids along the coastal areas of the island where most sugar production was taking place, and the restrictive measures which permitted commerce only with the port of Seville, were among the main causes of the lack of development of the sugar industry and the general economic stagnation of the island.

Communications with Spain were sporadic, and there was no outlet for island products. As a result, most of the population practiced subsistence farming and animal husbandry, and traded with the French and English for the supplies which never came from Spain. The main island crops plantains, bananas, rice, cotton, maize, cassava, and root crops were grown in small farms mostly in coastal areas (Steward, 1956:37).

Throughout this period, the only two "urban" centers were San Juan and San German. Most of the population lived dispersed in small estancias along the coastal areas. Because of the increased raids by the Carib and the corsaires which pointed out the vulnerability of the coastal settlements to outside attacks, the construction of military structures was begun. The construction of fortifications occupied most of the sixteenth and seventeenth centuries and reflected the Crown's basic interest in Puerto Rico as a military outpost forming a connecting link with the mainland colonies. Authorization for the first defense construction on the island was given by Royal Decree in 1532, for the establishment of La Fortaleza which was completed in 1582 (Torres Ramirez, 1968:216). The El Morro fortifications were also started during the sixteenth century, and construction continued throughout the seventeenth century.

Other fortifications were constructed as well. Among these were the Santa Elena Fort, located between El Morro and La Fortaleza, the Fort in del Canuelo (Palo Seco), the Fort in del Boqueron (now San Geronimo), the fort in the entrance of the San Antonio bridge, and the construction of the walls of San Juan (Torres Ramirez, 1968:215-223).

Although attention was given to fortify the city of San Juan, none was given to the socioeconomic development of the island. Steward offers the following picture of the social and cultural development of Puerto Rico during the first two centuries of colonial rule (Steward, 1956:41-42):

"As we have seen, these early centuries were marked by rapid decimation and genetic assimilation of the aboriginal population, the importation of Negro slaves in limited numbers, the maintenance of a military

garrison and a group of church officials, and the growth of a group of independent farmers mainly engaged in the production of subsistence crops."

He also distinguishes six main social groupings in seventeenth century Puerto Rico:

1. A small upper stratum of cattle breeders and sugar farmers.
2. Spanish officialdom- civil, military and ecclesiastical authorities.
3. Isolated, small, independent subsistence farmers of undetermined number.
4. Independent laborers who worked as artisans in towns or on the few haciendas and produced handicraft goods.
5. Slaves.
6. A group of landless laborers foreshadowing the eighteenth century agregados (this group probably included free blacks).

Eighteenth Century

During the eighteenth century Spanish colonial possessions became increasingly vulnerable to foreign invasion and occupation. The fall of Trinidad to the English and the taking of La Habana in 1763, are two important examples of this. In an effort to maintain its hegemony, the Spanish Crown became more interested in developing its possessions, militarily, economically and socially.

Most eighteenth century descriptions of Puerto Rico emphasize its great fertility and potential for agricultural growth in contrast with the poor condition of its inhabitants. Because of the Crown's mercantilist

commercial policies, there was no market for cash crops and therefore no economic incentive for increased production. As was discussed above, the dispersed settlement pattern characteristic of the first two centuries of colonization, and the lack of commercial activities contributed to the economic stagnation of the island.

During the second half of the eighteenth century, things began to change. With the establishment of new Crown policies and the creation of new settlements, population began to increase, new immigrants settled in the island and commercial cash crops gained in importance.

Population figures for the early part of the eighteenth century are incomplete but sources point to a rapid demographic expansion in the second half of the century. Steward (p. 45) cites the following population figures:

1700 -	5,000
1759 -	28,000
1765 -	44,000
1777 -	70,210
1787 -	103,051

Although most of the population continued to live in the rural areas, many lived in the new settlements established on the island. There were 30 towns in Puerto Rico by the end of the eighteenth century. These are listed by Torres Ramirez as follows (1968:16-28): San Juan, San German, San Mateo de Cangrejos, Loiza, Fajardo, Humacao, Guyama, Cayey de Muesas, Coamo, Rio Piedras, Caguas, Guynabo, Bayamon, Toa Alta, Toa Baja, Las Vegas, Manati, Areibo, San Miguel de Cabo Rojo, Utuado, Tuna, San Carlos de Aguadilla, Moca, Pepino, San Francisco de La Aguada, Santa Rosa del Rincon, Anasco, Mayaguez, Yauco and Ponce. As can be seen here, the great majority of the new settlements were located on or near the coast, continuing the pattern of settlement characteristic of the earlier periods.

An important factor in the population expansion and increased agricultural development that began in the latter half of the eighteenth century was the enforcement of a series of land reforms and the opening up of new ports of trade with Spain and the Spanish West Indies. Up until 1758 when the Crown ordered that each settler be given official title of the land on which he lived, all land had been the property of the Crown. Most cultivable land on the island was not dedicated to agriculture, but was occupied by large hatos or pasture lands. These were abolished and estancias were created (Steward, 1956:45). This land reform process took a long time to complete, and it was still taking place in the nineteenth century. Nevertheless, it provided an incentive for increased agricultural production and by virtue of the land tax levied on the new proprietors, produced revenue for the completion of the fortifications in the capital and the payment of military personnel (Torres Ramirez, 1968:32).

As mentioned above, the incentives for increased agricultural production established by the land reform of the eighteenth century were accompanied by the beginning of liberalization of trade. In Spain, the ports of Alicante, Cartagena, Malaga, Barcelona, Santander and Coruna were opened for trade with the Antilles, in addition to the earlier ones of Cadiz and Seville (Steward, 1956:47). In 1757 Puerto Rico was given authority to trade with Marguerrette and Santo Domingo, and in 1804 the ports of Cabo Rojo, Ponce and Fajardo were opened to trade as well as those of Mayaguez and Aguadilla (Steward, 1956:47).

The importance of commercial crops such as sugar and coffee, for example, resulted in an increase in the slave population. However, because of the increase of the white population as well as the manumission of many slaves already in the island, the proportion of slave population decreased from 11% in 1765 to 8-1/2% in 1800 (Steward, 1956:48). During this period, it seems that there was a greater number of landless laborers, both white, mulato and black, than slaves (Steward, 1956:68).

Nineteenth Century

The nineteenth century was a period of significant and rapid change in Puerto Rico. The land reform and liberalization of commerce measures initiated in the eighteenth century paved the way for these changes. The Cedula de Gracias of 1815 provided further incentive for population increase, development of commercial and plantation farming and the profound social and cultural changes that accompanied the economic development of the island. This Cedula "permitted free commerce with the United States and foreign colonies, extended permission to import slaves, machinery and farm implements and permitted immigration of foreign capitalists of Catholic faith and their slaves with all kinds of incentives and encouragements, including generous grants of land" (Steward, 1956:48).

The percentage of land under cultivation and the production of cash crops increased during the nineteenth century. There was also an increment in commercial activity with the West Indies, Spain and the United States, and a subsequent decline in subsistence crop production, signaling the need to import foodstuffs by the end of the century.

Of all the cash crops cultivated, sugar became the most important, with production increasing from 176,343 lbs. in 1803 to 221,220 lbs. in 1879-80 (Steward, 1956:52). The investment in new machinery and consequent improvements in technology resulted in an increasing tendency to centralize grinding facilities and to establish large land holdings. In the 1840's oxen powered, steam powered and hydraulic powered mills were in operation, and in the 1870's efforts were started to organize large-scale mills or centrales, which displayed many of the small landholders (Steward, 1956:54).

The increasing importance and volume of the sugar industry found new export incentives in the United States market. By 1897, 61% of Puerto Rico's sugar cane crop was exported to the United States, as opposed to 31% to Spain, and 8% to other countries (Steward: 1956:54).

Coffee was another important cash crop, cultivated mainly in the mountainous interior of the island. The planting and harvesting of coffee did not

involve any large scale investment nor machinery, and as a result small coffee haciendas based on family labor were maintained.

Cotton was also an important export crop during the first half of the nineteenth century, and tobacco was also grown, mainly by small farmers who rotated it with subsistence crops (Steward, 1956:55).

Population increased from 155,406 inhabitants in 1800 to 953,243 in 1899 (Steward, 1956:51). This increase in population, coupled with the tendency toward concentration of land into fewer hands resulted in a considerable number of landless laborers. They were bound to the land by forced labor as a result of an 1849 decree imposed by Governor Don Juan de la Pezuela known as the "ley de la libreta." Brau (1975:246) describes this system as follows:

".....imponiendo a los jornaleros agricolas una cartillo o libreta en la cual debian los propietarios, al tomarlos a su servicio, hacer constar el ingreso en la finca, los dias en que, voluntaria o involuntariamente se mantenian sin trabajar y la fecha en que terminaba el compromiso; cohibiendo la traslacion del bracero o otra hacienda mientras no pagase sus deudas en la que antes lo ocupara."

...imposing on the farming laborers a chart or notebook in which the landowners would show the days in which they had not worked (voluntarily or involuntarily), when hired, the date and the length of their term, to restrain the transfer of the bracero (laborer) to another hacienda before paying his debt. (Translation by Ana Burgamy)

Slave labor was also available, concentrated mainly in the coastal sugar estates, although slaves were also utilized in some of the coffee plantations of the interior (Steward, 1956:57). Nevertheless, it was free, landless jornaleros who formed the bulk of the labor force. With the decline in the slave trade and the abolition of slavery in 1873, the slave plantation was substituted by a new plantation culture formed by agregados who resided in the plantation (Steward, 1956:60).

Important sociocultural changes took place in Puerto Rico at this time. A class of wealthy planters and merchants developed as a result of the burgeoning commerce in export crops. Small farmers were displaced, and increasing separation between large and small landowners occurred. Towns also gained importance. The population of the island towns consisted mainly of administrators, landowners, credit agents, owners of large businesses, small merchants, artisans, service personnel and laborers, while the rural society was composed as large landlords and their workers as well as some medium and small farmers (Steward, 1956:60).

These social and economic developments also affected the political situation of Puerto Rico. The development of a Puerto Rican bourgeoisie, with interests which were in conflict with those of the Spanish Crown resulted in political action by landowners and merchants oriented towards gaining more economic and political freedom from Spain. Many historians describe the nineteenth century as that of the formation of the Puerto Rican nationality. The following lines from Steward summarize the political and social unrest in nineteenth century Puerto Rico:

"The growing pressure for abolition and equal rights of the Negro, the movement against forced labor, the quests for political freedom, the increasing demand for expanded educational facilities, all these were evidence of a spirit of unrest. Most importantly, a substantial class of merchants, professionals, and wealthy local planters had developed as the result of expanded economic activity. This class was instrumental not only in pressing for reforms of the kind noted above, but also assumed an important political role in the struggle for greater political freedom. Some of its numbers worked for complete separation and independence from Spain. Others favored a provincial status within the Spanish monarchy. Many, however, called into question the politico-socioeconomic status quo... The participation of Puerto Ricans in the Cuban revolts, the slave rebellions of Vega Baja and Ponce, the short-lived insurrection in the municipio of Lares, the activities of such men as Hostos, Betances and Baldorioty de Castro show that a Puerto Rican national consciousness, opposed to Spanish rule, was developing throughout the nineteenth century. The pattern of sporadic revolt,

rebellion and protest followed by new and sterner government measures aimed at stifling resistance persisted until the end of the century. It was not until 1897 that Spain appeared to recognize the danger of her continued domination in ignoring the island's demands. In that year she made important concessions to Puerto Rican sentiment through the granting of a considerable measure of local autonomy."

In summary, the end of the nineteenth century saw the formation of a Puerto Rican national consciousness, the development of a Puerto Rican wealthy class, and the increased importance of foreign trade (especially with the United States) in the export of cash crops. The trend toward centralization of sugar production, which was to have its foremost development under American rule, began during the Spanish period.

Twentieth Century

A certain degree of local autonomy was granted to Puerto Rico only months before the United States take over. The autonomic government was established on November 28, 1897. Its main elements are discussed by Brau (1975:292-293):

"El 28 de noviembre aparecio en la 'Gaceta de Madrid' un real decreto estableciendo en Puerto Rico, como se establecia en Cuba, la autonomia administrativa por tanto tiempo reclamada, fiandose a una camara de representantes y un consejo de administracion el regimen insular, bajo la autoridad del gobernador general asistido por cinco secretarios de despacho.

El gobierno de la metropoli se reservaba todas las facultades inherentes a la soberania nacional, dejando a las camaras insulares la legislacion colonial en cuanto a tributos, gobernacion, hacienda y fomento, formacion de presupuestos, tarifas arancelarias y tratados de comercio, conservandose la representacion en cortes, y ampliandose las atribuciones de la Diputacion provincial."

On November 28, a Royal Decree appeared in the Gaceta de Madrid by which an autonomous administration was established in Puerto Rico, as well as in Cuba, which had been demanded for a long time, trusting it to a House of Representatives and Advisory Counsel of Insular Government under the general authority of a Governor, assisted by five secretaries.

The Government of the metropoli reserved to itself all faculties to maintain national sovereignty, leaving the legislation of the colony to the camara insular regarding taxation, government, finance and development, budgeting, duties or tariffs, and commercial treaties, keeping representation in court and widening the attributions to the provincial deputy representatives.

(Translation by Ana Burgamy)

The Puerto Rican insular government was just beginning to exercise the provisions of the Carta Autonomica when war broke out between the United States and Spain. San Juan was bombarded by United States military forces on 11 May (Brau, 1975:295). On 25 July the Americans, under the command of General Nelson A. Miles, disembarked in Guanica. Between 25 July and 12 August, United States military forces occupied the towns of Guanica, Yauco, Ponce, Mayaguez, Utuado, Coamo and Guayama (Brau, 1975:300-304).

The peace treaty with Spain was proclaimed in Washington on 11 April 1899, and United States military rule was instituted in the island. With the First Organic Act of 1900, also known as the Foraker Law, the United States Congress instituted a civil government which consisted of a governor and an executive council appointed by the President, and a House of Delegates to be elected by popular vote (Steward, 1956:79). This Act substituted the military government, but could not be considered full/self-rule to Puerto Rico. The following statement by Senator Foraker exemplifies Congress' thinking at this time:

"The people of Puerto Rico differ radically from any other people for whom we have legislated previously. Above all, they have had a different experience in matters of government. They have had no experience which would qualify them in the light of testimony made

before our committee in the hearings which were held- for the great work of government with all the bureaus and departments needed by the people of Puerto Rico (Maldonado Denis, 1972:90-91)."

Many Puerto Ricans were unsatisfied with this Act, and two parties, the Republican Party which favored annexation to the United States, and the Union Party, were founded. One of the important leaders of the Union Party was Jose de Diego, who was instrumental in including independence as the political base of the Union Party (Maldonado Denis, 1972:93). Other tendencies within the Union Party leaned toward autonomy, and even statehood as other alternative solutions to the Puerto Rican status situation. Luis Munoz Rivera, another prominent leader of this party, was one of those leaning towards autonomy. Matienzo Cintron left the party and founded the Independence Party in 1912 (Maldonado Denis, 1956:98).

The Union Party, under the leadership of Munoz Rivera supported the 2nd Organic Law, or Jones Act, passed by the United States Congress in 1917. This Act created a legislative body for Puerto Rico consisting of a House of Representatives and Senate elected every four years. It also gave automatic United States citizenship to all Puerto Ricans born after 1917 (Steward, 1956:80).

The legislative body created by this Act was modeled after the United States. The Governor was appointed by the President, as well as the attorney general, the auditor, the commissioner of education and the Justices of the Supreme Court (Steward, 1956:80). Under this act, Puerto Ricans could now be members of the United States Armed Forces.

The economic aspects of the Spanish cession of Puerto Rico to the United States were significant. It signaled changes that aimed towards a "more efficient exploitation of the economic potential of Puerto Rico as a political and economic dependency (Steward, 1956:63)." Although the agrarian basis of the economy was maintained during the first fifty years of American administration, it was based on an overwhelming emphasis on cash crops such as sugar cane, cultivated in large scale plantations controlled

by United States corporations. In the words of Steward (1956:62), "Puerto Rico became an economic dependency of the United States through its incorporation within the federal tariff structure, through the absorption of its foreign trade through the use of United States currency, through the extension of massive amounts of credit from the mainland for investment in sugar refining, through the federal financing of some public services on the island, and so on."

The emphasis of production of sugar for export to the United States added to the sharp increase in population and increased the dependency of the island on imported foodstuffs. In 1945, although more than 300,000 cuerdas of food crops were grown, Puerto Rico imported 40% by bulk and 60% by value of all food consumed (Steward, 1956:73).

As was mentioned above, the cultivation of sugar cane as the main cash crop formed the basis of many of the economic, political and sociocultural changes characteristic of this period. The pattern of land fragmentation and concentration developed mainly in the coastal plains devoted to sugar crops, especially in the south coast irrigated areas (Steward, 1956:67). Large scale production required large expanses of land and mills equipped to grind large quantities of cane. Coastal lands previously devoted to the raising of livestock and the planting of minor crops such as plantains, rice, pineapples, vegetables, etc., were brought by large American corporations and converted into sugar plantations. As stated by Morley (1974:217), "between 1898 and 1930, the movement of United States capital into the Puerto Rican economy destroyed the traditional pattern of individual land ownership and consolidated the dominance of the large external corporation."

This situation, although profitable to United States economic interests, created a rural population which was subemployed and living at subsistence level. The effects of American sugar policy on Puerto Rico are summarized by Steward as follows:

1. absenteeism

2. insufficient pay to cane workers
3. miserable living conditions for the families of the cane workers
4. periodic or seasonal employment
5. excessive economic domination exercised by the corporation over thousands of people
6. intervention by the corporations in the civic life of the people
7. intervention in the development of social freedom
8. inequality of contributions to the island which clearly favored the corporations and the great landowners
9. concentration of income in few hands

Another important cash crop which benefited from the free entrance into the American market but whose increasing importance did not lead to land concentration and absenteeism was tobacco. As was the case during Spanish times, it continued to be grown in small plots of land by small, Puerto Rican farmers in the mountainous regions of the island, especially in the eastern highlands and in the Caguas, and La Plata valleys (Steward, 1956:72).

Because of the Puerto Rico's economic dependence on the United States, the depression of the 1930's had a profound effect on the island. Economic disorganization and poverty was widespread. The 1930's experienced the development of the Nationalist movement in Puerto Rico, a party which was founded in 1922 by members who separated from the Union Party (Maldonado Denis, 1972:115). It was a period of increased repression and of strong anti-American feelings on the part of the population (Steward, 1956:80). The 24 October 1935 hostilities between the insular police led by Colonel E. Riggs and a group of Puerto Rican nationalists, which came to be known as the Rio Piedras Massacre, and the killing by police of two young nationalists who had assassinated Colonel Riggs in San Juan are examples of this (Maldonado Denis, 1972:123).

Another important leader during the 1930's was Luis Muñoz Marin, who was a strong advocate for independence. The Partido Acción Social Independentista was formed under his leadership. It participated in the 1940 elections as

the Partido Popular Democratico (Popular Democratic Party) on a program of land reforms designed to help the rural workers and the small landholders (Steward 1956:81). Under Munoz Marin's leadership the Popular Democratic Party shifted its platform away from independence. It gained the support of a great majority of the island population, winning the elections of 1944 by a great margin (Steward, 1956:81).

The Popular Democratic Party was instrumental in negotiating the establishment of the Free Associated State status for Puerto Rico, officially approved by the United States Congress in 1952. It instituted a constitution for Puerto Rico which was drafted following that of the United States constitution. Despite the granting of self rule in insular affairs, it did not alter the basic fact that sovereignty continued to reside in Washington.

The 1940's also saw the beginning of government plans to industrialize the island. This was seen by the Popular Democratic Party as a means of resolving the island's economic problems. The Puerto Rican Industrial Development Corporation was established to provide credit and tax exemption incentives for private enterprise to invest in the island. With these incentives, plus the abundant cheap labor and the "political stability" of the island, the Commonwealth of Puerto Rico embarked upon the industrialization program. This program was accompanied by massive changes in the Puerto Rican agricultural system and the migration of thousands of rural peasants to the urban slums of Puerto Rico and the United States. The phenomenon of mass mitigation, which at present accounts for 2 million of the island's people residing in the United States, was a policy of the Puerto Rican government. By "exporting" surplus labor to the United States, island unemployment was decreased and the benefits, of industrial development, in terms of salaries, commodities, etc., could be divided among a smaller number of people.

The industrialization program, the establishment of government agencies to foment industrial development and to establish social welfare programs, the expansion of centers of higher education, etc., fomented the development of

a large middle class which has been a conservative force in island politics (Maldonado Denis, 1972).

During the 1960's the industrial development of Puerto Rico was reoriented towards heavy industries, such as petrochemicals, requiring large amounts of capital, but not providing little local employment.

The transformation of Puerto Rican society from a rural, agricultural country to an industrialized country has not altered Puerto Rico's economic dependence on the United States. Puerto Rico's political status has also remained basically unchanged. This is summarized by Steward in the following statement (Steward, 1956:83):

"The fundamental governmental pattern in Puerto Rico is one of representative government without actual sovereignty. Political attitudes and functions, although within the tradition of political democracy, are not mirror images of those in the United States. Puerto Ricans vote for a legislature whose laws may be vetoed by the President or revoked by the American Congress, which itself may pass legislation which they do not want.

They elect a governor who decisions may be reversed by the President.... Moreover, Puerto Rico has become an important link in the defense of a nation which gives them no voice in its national affairs, and Puerto Ricans are compelled to serve in the United States armed forces."

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APPENDIX C

**A STANDING STRUCTURES RECONNAISSANCE OF
FIVE PROPOSED PROJECTS IN PUERTO RICO**

by

CHARLES W. MOOREHEAD

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A STANDING STRUCTURE RECONNAISSANCE
OF FIVE PROPOSED PROJECTS IN PUERTO RICO

INTRODUCTION

During December 1979, an architectural reconnaissance was conducted in five proposed project areas in Puerto Rico: Rio Puerto Nuevo, Rio Grande de Loiza, Rio Tallaboa, Rio Guanajibo, and Rio Fajardo.

The purpose of the reconnaissance was to satisfy current Federal cultural resources laws as referenced in Department of the Army Engineering Regulation 1105-2-460, Identification and Administration of Cultural Resources. Specifically, a reconnaissance level investigation is to identify what types of cultural resources lie within or near the proposed project area. Based on this information, a report is prepared presenting the findings and recommendations for continued management of these resources.

This report presents the baseline information on observed and anticipated historic structure resources within each project area and recommendations for future work. It is to be noted that photographs of each standing structure visited during this reconnaissance are on file at the Mobile District, US Army Corps of Engineers. Selected examples of each structure type discussed within this report are presented for illustrative purposes.

Previous Studies

Unfortunately, most architectural studies conducted on Puerto Rico have been general in nature. This means that those studies have provided rather basic descriptions and/or have concentrated on more formal aspects of architecture. Consequently, there is little information available on the early folk architecture of the island.

One individual, Ms. Carol F. Jopling, however, conducted a comprehensive architectural survey of the island during late 1978 and early 1979. This reconnaissance has used her information liberally with her permission.

Ms. Jopling's manuscript, Puerto Rican Houses: A Pictorial Survey and Cultural Interpretation, represents the state-of-the-art at this time.

A Brief Architectural History

Three major groups have had the greatest influence on Puerto Rican culture. These are the original indigenous Indian populations, Spanish colonists and African slaves. The architecture of Puerto Rico reflects these cultures because people's dwellings are a direct expression of their culture. Hence, many of the now extant houses on the island reflect a combination of house types derived from these three separate and distinctive culture groups.

Prior to the arrival of the Spaniards, the indigenous population lived in houses called bahios. Figure 1 represents this type of early house. Bahios were constructed from post and thatch, either directly on the ground or raised. Apparently, the bahio was a substantial structure which provided needed shelter from the elements.

A later house type, the jibaro, replaced the bahio. Likewise, the jibaro house was constructed of poles and thatch and was rectangular in shape. Often these houses were located in the cane fields and appeared as small one-story structures. Two types of construction were used alternately. The native craftsman built the framework of his house from poles interlaced with one another. This frame was then covered with dry cane or palm leaves. The vernacular type of jibaro house had a frame constructed from posts which were then boarded over. The roof was constructed of tin or some other metal covering. Each house was raised 2-5 feet above ground, providing convenient storage space for household goods.

The Negro population also contributed to architectural styles of Puerto Rico. African contributions were less influential than either Indian or Spanish influences, basically because of their enslavement. Obviously, the concern of slaveowners was not oriented to the free expression of African art and craftsmanship, but the conformity to existing Spanish culture. This fact alone probably accounts for the lack of a flourishing African culture today. However, even with the handicap of slavery, Africans contributed by way of free blackmen.

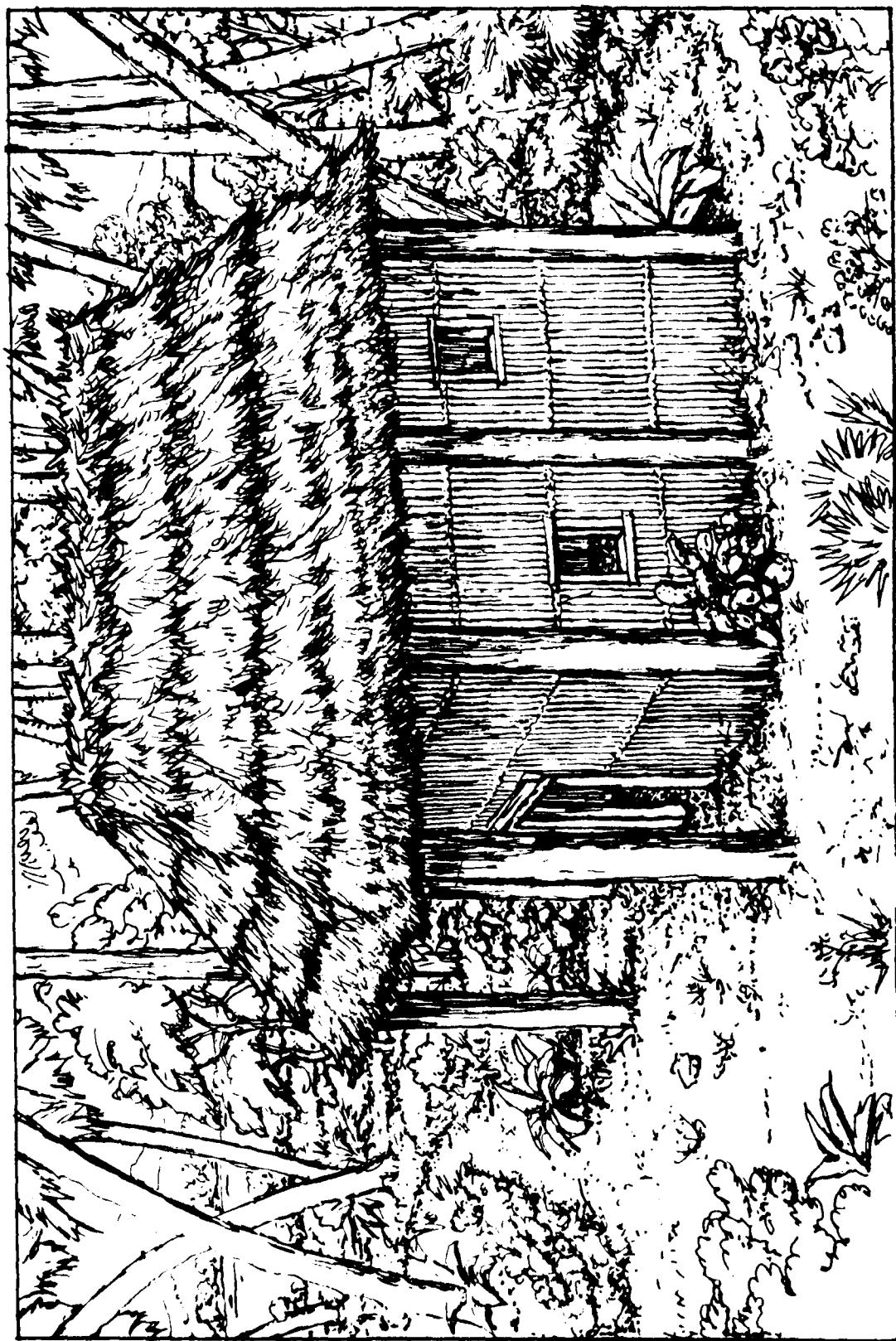


Figure 1 An Idealized Version of a Manio.

"In contrast areas always occupied by descendants of free Blacks or freed Black slaves houses are built on or close to the ground and resemble the African design shotgun house found elsewhere in the Caribbean." (Jopling: PR17)

Spanish influences had the greatest impact on Puerto Rican architecture, and this is evident within the City of San Juan. As the City of San Juan developed, houses took the form of those found in Andalusia and Extremadura, Spain, from where the early settlers came. These structures were modeled on the convent with central cloister surrounded with arches. These houses were built on the ground with no space between them.

Other than this urban type of architecture, the haciendas developed in a different environmental setting. Haciendas were relatively isolated from the cities due to poor transportation systems and this required self-efficiency. Perez-Channis describes the hacienda complex as composed of:

"... a large ancestral owner's house of two or more warehouses, a manager, a milk house, machine house, drying sheds, the mayordomo's (steward's) house and the house of the agregados (landless workers). The main house was built of the native ironwood with the residential areas surrounded by exterior galleries like a balcon. In the back there was a large kitchen where cooking was done for the patrons and workers. The workers' houses consisted of several sleeping rooms in a line, with a narrow outside balcony for communication. These structures were built on short posts above the ground. Later the main houses became a two-story structure." (1976:37)*

Increased commercialization and immigration from such places as French-Haiti, Santo Domingo and Spanish from the Canary Islands, Catalonia and Venezuela, caused a change in the architecture. In areas in the south and west, houses appear depicting pieced wood fanlights, balconies with wrought iron railings, wooden jalousies and a high pitched roof.

*Translation by Jopling

After 1898, when the United States gained possession of Puerto Rico, American architectural influence was felt. However, such house types as the multifamily dwelling and central hall structures were not well received. One possible reason for the unpopularity of these structures is that they were not suited to a climate where more open spaced houses provided the needed cross ventilation.

In summary, as Ms. Jopling has noted, Puerto Rican houses are a mixture of Indian, Spanish, and African influences with American architectural design being the least influential.

THE RECONNAISSANCE

Reconnaissance Methods and Techniques

Two approaches were taken during this study. First, a sample of structures outside of the project areas were recorded. This was done by a windshield survey of structures on approaching each community. Structures were also recorded in each community or town near the project areas. This information was valuable for comparative information on structures. Secondly, within each project area structures were located by windshield and pedestrian survey. The windshield survey was conducted by traversing the major highways in the area. Those roads which were less accessible were walked in search of structures.

The major recording technique was photography. This method was the best approach for a study of this type because it was rapid and accurate. The use of a camera was useful in overcoming the problem that none of the houses were vacant nor had any real estate rights been acquired on any of the properties.

Photographs were taken to best present all characteristic features of each house. In most cases, one photograph was taken of the front and side of each house. Photographs at these angles provided sufficient information on roof type and facade to type the structure. Few photographs were taken of backyards or backside of houses. Neither were the houses measured. Because

access to the interior of the houses was not obtained, plans of each house were not made. Thus, the houses presented in this report have been tentatively classified by type.

House Types

The classification of houses by type is based on Carol Jopling's field work. No new types are identified and her survey material has been found to be more than sufficient for the purposes of this report. Since there was no opportunity to identify house plan, the most diagnostic characteristic of a house, the types presented here must be viewed as preliminary. The houses have been typed based on facade, roof (number of slopes,) balcon (porch) and construction material.

House Type 1: The characteristic features of this house type are a corner balcon, the facade having two openings, the roof having two or four slopes and if a shed is attached the roof is usually flat. The construction material of the house is usually wood with the balcon being constructed of concrete. Occasionally the house will be constructed of mamposteria (rubble and brick) and reinforced concrete. This house type is one of the most prevalent on the island. Figure 2.

House Type 2: This house type is characterized by a straight front, a facade with two or three openings, the balcon runs along the straight front of the house and sometimes down both sides of the house. The roof has two or four slopes, and there is sometimes a shed attached with a flat roof. Figure 3.

House Type 3: The most distinguishing characteristic of this house is the side front entrance. The facade has two openings and there is no balcon. The roof is gabled and has two slopes. At times a shed is attached. This is not a common house type for the island and occurs most frequently in the north central and northwest areas. No examples of this house type were located during the reconnaissance.



Figure C-2. Type 1.



Figure C-3. Type 2.

House Type 4: This house type is also uncommon, but it is scattered throughout the island. Essentially, the house resembles a central hall house type. Sometimes an "L" shaped galeria is included as an extension. The facade has three or four openings with a balcon which sometimes covers the front and at times two or three sides. The roof has two or four slopes and sometimes a shed is attached with a flat roof. Figure 4.

House Type 5: A typical characteristic of this house type is the projecting dormitorios on either side of a central entrance. The facade is characterized by three or four openings. The balcon attached to this structure type extends across the front and down two sides. The roof has two or four slopes and may have a shed or extended shed with a flat roof. No examples of this type were located during the reconnaissance.

House Type 6: This structure is a multifamily dwelling with one story. This house type is rare historically as well as contemporarily. This is partly true because of the similarity of this type structure and old slave houses. Another important factor is that ventilation in houses of this type is poor. No examples of this type were located during the reconnaissance.

House Type 7: This particular house type is characterized by a hallway. Hallways in Puerto Rican houses are not common prior to 1900. Perhaps hallways were not popular because of their tendency to restrict ventilation. The facade has two, three or four openings. The balcon extends across the front and sometimes down the sides. The roof has two or four slopes and sometimes a shed is attached which has a flat roof. House Type 7 is usually constructed of reinforced concrete, however, some are built of wood. No examples of this type were located during the reconnaissance.

House Type 8: This is a two-story dwelling. The second story, however, is a partial structure often appearing as if one room was constructed on top of the roof of the first story. According to Jopling there are three varieties of this type. The first has the second story structure located at the back, the second variety has a second story resembling a tower, and the third variety has a second story structure centered on the house which resembles a belvedere. No examples of this type were located during the reconnaissance.



Figure C-4. Type 4.



Figure C-5. Type 10.

House Type 9: This is a two-story dwelling. The upstairs is usually reserved for the bedrooms with living space occupying the bottom half of the house. This structure type is thought to have been introduced by Americans and is rare on the island. Consequently, the house type may be expected to occur more frequently in areas of heavy U.S. contact. No examples of this type were located during the reconnaissance.

House Type 10: This type is also a two-story dwelling. Its functions differ from the others in that it houses two families - one on each floor. This type varies in its structural appearance and is common on the island, especially in low income areas. Often the second story is reached by an outside stairway. Construction materials consist of wood and mamposteria with cement and iron additions. Figure 5.

House Type 11: This structure combines a place of business with a residence. Usually, the first floor is reserved for the "store" and the second floor houses the owner or operator of the business. This is a very common arrangement and is found in both urban, suburban and rural parts of the island. The facade of the structure has three or four openings, the balcon is straight across and the roof has four slopes. Figure 6.

House Type 12 (Suburban Houses): This house type is made up of Types 1, 2, and 4. Most often this type is located in small towns and small settlements along rural roads and on the outskirts of large cities. These structures are more often than not built on zocos (stilts.) Many times these houses have a facade which has two to four openings, balcons located at the corner, straight on two sides and three sides. The roof may have two or four slopes. Figure 7.

House Type 13 (Hacienda Houses): There are two types of this house and they are the sugar and coffee haciendas. The coffee haciendas are located in the mountains and these were usually small, family-operated concerns. On the other hand, sugar cane production requires large amounts of land and intensive labor to grow and harvest the cane. Essentially the sugar plantations were located in the low coastal areas and were composed of a large owner's house, houses for superintendents, etc. Many times a hacienda is a modified



Figure C-6. Type 11.



Figure C-7. Type 12.

Type 2 or 4 house on stilts. This house type has four openings in the facade, the balcon is usually straight front and back, and the roof usually has four slopes, sometimes with an extended shed. Coffee haciendas are built of wood and sugar haciendas are made of mamposteria on the first story and wood on the second. Figure 8.

House Type 14: These structures have at least two forms in terms of construction materials. In early times they were constructed of wood; however, more recently they are made of reinforced concrete and resemble the suburban and urban houses. One distinguishing characteristic of these houses, no matter what construction material, is their plainness. Many times these houses can be typed as 1, 2, or 4 types. The facade has two or three openings and is most often unadorned. The balcon is usually straight and at times may extend down both sides of the house. The roof may have two or four slopes. No examples of this type were located during the reconnaissance.

House Type 15 (Miscellaneous): This classification of house incorporates all of those structures which are aberrant to those already described. Below are listed those Type 15 houses identified by Jopling:

- a. One-Room Houses: These structures often house older people who are supported by the community.
- b. Water Houses: These houses are built over the water on piles.
- c. Round Houses: This is indeed an unusual house. It appears circular with rooms running off the center.
- d. Unidentified.
- e. Modern.

Engineering and Industrial Resources

No attempt was made during the reconnaissance to type these resources as was done with houses. Each engineering and industrial resource encountered during the reconnaissance is described within their appropriate project discussions. Selected examples of these resources are illustrated to show the range of resources located. Figures 9, 10, 11, 12, 13, 14, 15, and 16.



Figure C-8. Type 13.



Figure C-9. Typical Concrete Bridge.

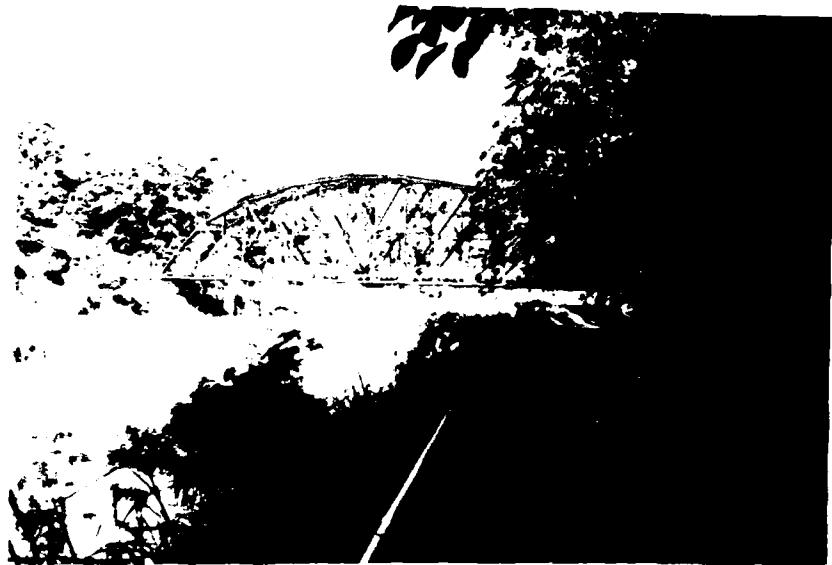


Figure C-10. Iron Truss Bridge.



Figure C-11. Concrete Bridge and
Irrigation Control Structure



Figure C-12. Rio Piedras Bridge.



Figure C-13. Water Pumping Station.



Figure C-14. Structure Associated
with Sugar Cane and Rum Production



Figure C-15. Abandoned Railroad Bed.



Figure C-16. Abandoned Sugar Cane Railroad Cars.

RIO PUERTO NEUVO

Architectural Resources

The Puerto Nuevo Project is characterized by the absence of houses within the proposed project boundaries. The upper limits of the project area ends at Roosevelt Avenue bridge. This area contains the only dwellings observed, and these are not traditional houses.

Engineering Resources

Five bridges were recorded within the project area.

Bridge 1: This is a very recent precast concrete bridge which is part of an expressway.

Bridge 2: This is a wooden, metal and concrete structure of recent origin. It is no longer used and has been replaced by Bridge 3. This bridge may be impacted by the project.

Bridge 3: This is a modern precast concrete bridge which is part of Highway 22.

Bridge 4: This is a concrete structure of recent origin and is part of Roosevelt Avenue.

Bridge 5: This is the only bridge of historical significance located in or near the project area. The following description of the bridge, known as Puente del General Norzagaray, is taken from Monumentos Historicos de Puerto Rico prepared by the Instituto de Cultura Puertoriquena. (Translation this report)

Situated on the Rio Piedras and Caguas highway, and more well known as the Bridge of the Friars, it is the most complete and interesting bridge preserved from the Spanish period. It was designed by the Chief Commander Captain of Engineers, Don Manuel Sachez Nuñez y Layne, the contractor was the engineer Gustavo Steinacher. Completed in 1855, the Central Directorate of Roads resolved in that year that it would be named for the Governor, General Norzagaray.

Information on this bridge is filed in the General Archives under the name Rio Piedras Bridge.

Industrial Resources

Only one industrial resource was located. Conflicting information, however, was gathered on this structure. One story related to the field party was that the structure was built during Spanish times and the second story was that it is a recent structure dating to the 1920's and 1930's. Since this structure is constructed of brick with a rubble facing, mamposteria, and the brick is similar to that used to build early structures in Old San Juan, this seems to lend credence to the first story. Presently, the structure is a water pumping station. The second story related that this was the original use and purpose of the building. If this is true, it may be that the machinery within the building should be investigated for its engineering contribution to the historical record. The chimney appears to indicate that the pumping station may have at one time been powered by coal or perhaps wood, indicating a steam-powered station.

RIO GRANDE DE LOIZA

Architectural Resources

Fourteen individual and groups of architectural resources were located within this project. The houses presented here represent only an example of the various types to be expected in the area and by no means are all of the structures.

House No. 1: This house is a country dwelling approximately four miles south of the town of Loiza. This structure is tentatively classified as a Type 2 house.

House No. 2: This structure is located on the outskirts of the town of Loiza. It is located in a low-lying area prone to flooding. This structure is classified as a suburban house, Type 12. The house is built on stilts which in this case seems to be due to its location.

House No. 3: This structure appears to be a Type 2 house, and is located within the town limits of Loiza.

House No. 4: This is a modern dwelling, which has not been typed. Stylistically it is urban. Such houses are common and are characterized by jalousie windows, carports and a flat roof.

House No. 5: Stylistically this house is a bungalow. It appears to be a Type 1 house and is located within the town of Loiza.

House No. 6: This structure appears to fall within the Type 1 category. This house is interesting for several reasons. First, it is located on the town square, a sign of status, and it has aesthetical qualities not observed on most of the houses inventoried. The house is embellished with a transom, sidelights and a banistered balcón. Further, the door is paneled at the bottom with an oval window in the upper portion. A gallery is present at the backside of the house, an unusual feature of Puerto Rican architecture.

House No. 7: This house is a Type 1 structure and is located one block from the square within the town of Loiza.

House No. 8: This house is classified as a Type 15 (Miscellaneous). Due to its unusual design (several balcóns around the house) and the addition of a concrete structure at the rear connected by a staircase, this house does not seem to fit any recognized type. It is located at the confluence of a stream and the ocean and probably is a recreation home.

House No. 9: Tentatively this house is classified as a Type 13 (Hacienda House). The structure is located on the outskirts of Loiza and is likely a copy of a true hacienda.

House No. 10: This is a Type 2 structure and is located within the limits of Loiza. It is of wood construction and has a concrete balcón.

House No. 11: This house is classified as a Type 2 structure. It is located in the country and is representative of many homes found on the island.

House No. 12: This structure is classified as a Miscellaneous Type 15, although it has similarities to a Type 10 house. This structure has an extended porch on the second floor with a "carport-like" enclosure on the bottom floor.

House No. 13: This house is located on the square in Gurabo. Tentatively this structure is typed as a Type 15 (Miscellaneous). The structure could perhaps be typed as a 4 if floor plans were available.

House No. 14: This complex is located in Pueblo Norte. It is tentatively typed as a Type 15 (Miscellaneous). From a distance the complex appears as a single unit. The top portions are used as a residence and the lower portion is a garage.

Engineering Resources

Three bridges were recorded, one of which also functions as an irrigation dam. One bridge appears historically significant.

Bridge 1: This bridge also functions as an irrigation dam with floodgates within the dam portion of the structure. The resource is constructed of concrete with metal floodgates. In the sugar cane regions such structures are common, and their appearance indicates an intricate irrigation system directly relatable to past and present subsistence.

Bridge 2: This structure is typical of most small bridges in Puerto Rico and is very common. It is constructed of concrete.

Bridge 3: This is an iron railroad Bowstring Truss bridge spanning the Rio Loiza. It is not presently in use and deadends at a sugar refinery. The bridge is pinned and is a stationary structure. Its condition is poor because of rust and non-use. A tentative date for this structure is 1840 to the late 19th Century.

Industrial Resources

Structure 1: This structure is located within the town of Loiza. It is constructed of brick, faced with concrete and has arches over the windows. The assumed use of the structure is as a community center where dances and other cultural events are held.

Structure 2: This brick chimney represents the remains of a sugar refinery in the town of Juncos, and is now a part of a restaurant.

Structure 3: This is also the remains of a sugar mill complex, with this structure apparently used as a warehouse. It is constructed of brick with a concrete facing. This particular structure does not appear early, based on the type of brick used. It is, however, a good example of the type of architecture likely present within the project as a standing structure.

RIO TALLABOA

Architectural Resources

Only houses were recorded in this project area. The embellishment noted on the houses located are indicative of "French" influence.

House No. 1: This is a Type 1 structure.

House No. 2: This is a Type 1 structure with "gingerbread" at the front.

House No. 3: This is a modern concrete structure appearing to be a Type 1 house with tile embellishment on the roof fringe.

House No. 4: This is a Type 1 house.

House No. 5: This a Type 1 house.

House No. 6: This house could not be typed.

House No. 7: This is a country house that appears to be a Type 1.

RIO GUANAJIBO

Architectural Resources

Nineteen structures were located in this project. Two structures were recorded near the city of Ponce because of their typical nature.

House No. 1: This house is on the outskirts of Ponce. It is a Type 1 structure and resembles a "shotgun house" found in the southeastern United States. This structure is raised on piers.

House Nos. 2, 3 and 4: These structures represent an urbanization project outside of Ponce. These are the structures that are replacing houses such as House No. 1 and are classified here as Type 15 (Miscellaneous).

House No. 5: This house is located very near the project limits. The house is empty and is the most unusual and interesting house located during the reconnaissance. Its features single it out as a non-typical structure and include it being raised on stilts, bungalow in style and having a balcon on the front on one side only. The house is classified as a Type 15 (Miscellaneous).

House No. 6: This structure is classified as a Type 10.

House No. 7: This is a modern dwelling and has not been assigned a type. Stylistically it is urban. Depending on floor plan it could be a Type 1 or 2.

House No. 8: This is classified as a Type 2. It is bungalow in style and borders the project.

House No. 9: This is a Type 1. It is an older dwelling constructed of wood with a modern addition of jalousie windows.

House No. 10: This is a Type 4 house because of its central hall.

House No. 11: This is a Type 2 structure with stylistic characteristics of a "shotgun" house.

House No. 12: This house combines the features of a traditional house with those of more modern ones. The structure is a Type 1 but is constructed of concrete.

House No. 13: This Type 1 structure is an "older" structure as exemplified by its wooden construction.

House No. 14: This is a modern house and appears to be a modified Type 1. The addition of a carport is a departure from the traditional house plan; therefore the house is classified as a Type 15 (Miscellaneous).

House No. 15: This is a modern house classified a Type 15 (Miscellaneous). It appears to be a concrete "quonset hut."

House Nos. 16, 17 and 18: These structures are located on the square in the town of Sabana Grande. This variety of structure is classified as Type 11.

House No. 19: This structure appears to have been converted from a residence into a campaign headquarters. It is a Type 2 structure.

RIO FAJARDO

Architectural Resources

House No. 1: This house borders on the Rio Fajardo on an elevated bank. It is tentatively typed as a hacienda, Type 13. Given that this area has traditionally been a sugar cane growing region, this seem appropriate.

House No. 2: This structure and outbuilding is a Type 15 (Miscellaneous) house. The outbuilding is partial pole and thatch construction and appears to cover a well. This building could be the remains of an earlier complex at this site.

House No. 3: This is a Type 15 (Miscellaneous) house. It is very recent and does not appear to be a permanent dwelling. It is made of plywood.

House No. 4: This is a Type 11 house. Usually these "commercial" structures have a small store on the lower level, but this building is aberrant in this respect and has a bar on the first floor. Living quarters are on the second floor.

House No. 5: This is a Type 15 (Miscellaneous) house.

House No. 6: This is a Type 15 (Miscellaneous) house.

House No. 7: This is a modern Type 1 house.

House No. 8: Although this structure is classified as a Type 12, it may be a variant of Type 2. Construction is of wood and it is a country home.

House No. 9 and Outbuilding: This is a typical structure with the Fajardo project area. The house is classified as a Type 15 (Miscellaneous) modern house. The outbuilding is typical of small home-owned and operated tiendas, serving the need for soft drinks, etc.

House No. 10: This is a recent Type 1 house made primarily of plywood.

House No. 11: This unfinished house is a good example of changing styles and construction materials in Puerto Rico today. Concrete blocks as well as precast cement is used. The house is a Type 15 (Miscellaneous).

House No. 12: This is a modern Type 15 (Miscellaneous) house.

House No. 13: This is a wooden Type 1 structure.

Engineering Resources

One concrete bridge was recorded at the town of Fajardo. This bridge is typical of such bridges throughout the island.

Industrial Resources

Structure 1: This is a water pumping station located on the banks of the Fajardo River. The date of construction for the station is estimated to be in the late 1930's.

Structure 2: This is the remains of a railroad across the Fajardo River used to transport sugar cane.

RECOMMENDATIONS

Architectural Resources

Based on the results of the field reconnaissance for architectural resources, it is apparent that most of these resources are of recent origin, even though they may retain traditional characteristics. Given this modern setting, it is recommended that an indepth and systematic survey be conducted, once the project boundaries are finalized, in order to locate any buildings, houses, or outbuildings which may retain their integrity.

Engineering Resources

The bridges located during the reconnaissance suggest that most of these resources are of a recent nature and older bridges have been replaced with concrete structures. However, the Rio Piedras bridge (Figure 12) is a notable exception and other bridges of its class may be present within the project areas. A survey for these possible older bridges should be part of any further cultural resources work. Additionally, the appearance of truss bridges within or near the project areas suggests that these types may exist and should also be included in future survey work (Figure 10). A third class of bridge is the small concrete type which also serves as irrigation control facilities (Figure 11). It is recommended that these small bridges be incorporated into any studies dealing with the sugar cane industry.

Industrial Resources

Two major classes of industrial resources were observed during the survey and these are water-related industries and sugar production. The water pumping station within the Puerto Nuevo project is an excellent example of such a resource which warrants further investigation if impacted.

The second class of industrial resources relate to the sugar cane industry. Figures 14, 15 and 16 are examples of the physical remains of this important industry and they should be included in future cultural resources studies.

APPENDIX D

**CULTURAL RESOURCES BACKGROUND
BY
KAREN ANDERSON CORDOVA**

CULTURAL RESOURCES BACKGROUND

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CULTURAL RESOURCES BACKGROUND

INTRODUCTION

Any investigator who embarks upon a study of a specific topic of Puerto Rican history is confronted by the task of plowing through a large quantity of written material. Much of this material, especially with respect to the early colonial period, is dispersed in historical accounts, descriptions and reports. Many of the early sources deal with Spanish New World possessions as a whole, or with the Caribbean area in particular, making it difficult to locate specific data on a region and/or topic.

A large amount of legislation was passed during the sixteenth and seventeenth centuries pertaining to Spanish possessions in the Antilles, Central and South America. Many of these documents have been compiled and published and are available to Puerto Rico. These form the principal sources for the early history of the island.¹

Many of the later historical sources are not published and remain as primary source documents. For example, most nineteenth century documents are housed in the General Archives Building in Puerta de Tierra, San Juan (Archivo General de Puerto Rico). There is a wealth of data here, almost all of it in manuscript form. An examination of these manuscripts requires a great deal of time, a command of the Spanish language, and a familiarity with nineteenth century Spanish paleography.

Because of the limited time available for the background and literature reconnaissance, the number of project areas involved and the quantity and dispersed nature of the primary historical sources, it was impossible to carry out an exhaustive literature search. Nevertheless, specific information concerning the five project areas was collected, although in an incomplete form, and is presented in earlier sections of this report.

¹ These, as well as other sources mentioned here will be discussed below.

Further documentary research of the five project areas will be required. This is necessary if a comprehensive cultural resources survey of each of these areas is to be carried out.

A bibliography of available Puerto Rican history sources has been compiled to provide the future researcher with a firm start in more detailed historical investigations. It is divided into two sections, one dealing with general ethnohistorical and historical sources and the other with the archival resources available in the General Archives of Puerto Rico. This bibliography is not exhaustive and should only be used as a guideline for future work.

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ARCHIVAL RESOURCES (NINETEENTH AND TWENTIETH CENTURY DOCUMENTS)

The documents in the General Archives of Puerto Rico are organized into different repositories or fondos which refer either to the original source of the documents, e.g., Fondo de Obras Publicas (Public Works Repository), or to the main subject which is being referenced, e.g., Fondo de Protocolos Notariales (Notary Protocols Repository). These repositories are subdivided into series and/or subspecies. Some of them, such as the Fondo de Obras Publicas, Serie de Aguas (Public Works Repository, Water Series), are indexed by subject and by area. The area usually refers to a particular town or river system. Some repositories have not been indexed,² and others are at present inaccessible.³

The following is a list of the archival repositories which should be consulted in future studies of the historical development of the Puerto

² E.g., Fondo de Obras Publicas, Serie Propiedad Publica (Public Property Series) does not have an index.

³ E.g., some of the municipal documents are not accessible, and the map collection is still in the process of being catalogued.

Nuevo, Sabana Grande, Loiza, Tallaboa and Fajardo areas. This list is applicable for any municipality in Puerto Rico.

Fondo de Obras Publicas (Public Works Repository)

1. Serie Aguas⁴ (Water Series)

a. Subserie Riego (Irrigation Subseries)

b. Subserie Canalizaciones (Channelization Subseries)

2. Serie Propiedad Publica (Public Property Series)

3. Serie Obras Municipales (Municipal Works Series)

4. Serie Edificios Religiosos (Religious Building Series)

5. Serie Carreteras y Puentes (Highways and Bridges Series)

6. Serie Puertos (Ports Series)

7. Serie Ferrocarriles (Railway Series)

II. Fondo Documentos de Gobernadores Espanoles (Repository of Documents concerning Spanish Governors)

Serie Municipio (Municipal Series)

III. Fondo Diputación Provincial (County Council Repository)

Serie Municipio (Municipal Series)

⁴ A breakdown of the location of all documents of this series pertaining to the Loiza, Sabana Grande, Tallaboa and Fajardo areas is provided in earlier sections of this report.

IV. Fondo Departamento de Hacienda (Department of the Treasury Repository)

Serie Tasacion (Land Appraisal Series)

V. Fondo Documentos Municipales (Municipal Documents Repository)

VI. Fondo Protocolos Notariales (Notary Protocols Repository)-available for each town

VII. Serie Agencias Gubernamentales (Government Agencies Series)

Subserie Diputacion Provincial (County Council Subseries)

The following libraries, institutions and government agencies should have the necessary sources for future research:

1. General Archives Building, Puerta de Tierra, San Juan
General library-first floor

Reference section where archival sources are kept-second floor

2. University of Puerto Rico Library, Rio Piedras
Puerto Rican Collection-second floor
3. Centro de Estudios Avanzados de Puerto Rico y el Caribe
Casablanca, Old San Juan
4. Local town libraries
5. Town churches-parish documents
6. Municipal government offices
land records data-Registro de la Propiedad (Property Register)

7. Government Agencies

Department of Natural Resources
Department of Public Works
Acueduct and Sewers Authority
Highway Authority
Housing Department
Treasury Department
Planning Board

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APPENDIX E

THE TOWN OF CAPARRA

BY KAREN ANDERSON CORDOVA

THE TOWN OF CAPARRA

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THE TOWN OF CAPARRA

INTRODUCTION

The town of Caparra was the first Spanish settlement in Puerto Rico. Historical sources document its founding by Juan Ponce de Leon in the year 1508 (Bague, 1961; Mayoral Barnes, n.d.; de Hostos, 1938; Coll y Toste, 1915) after previous attempts at establishing settlements in the Toa area and in the south coast of the Bay of San Juan had failed (de Hostos, 1938.).

Most sources agree that the explorations of the Caparra area followed disembarkation on the south coast of the bay, although there is evidence of a previous reconnaissance of the island in 1506, where the area was approached by land coming from west to east, through the Central Cordillera (Tio, 1961:147).

The settlement was established approximately one-half league¹ from the bay (Murga Sanz, 1957:519-22), in flat, well-drained expanse of land, surrounded by hills where there was abundant lumber and thatch for the construction of dwellings, and enough water to supply the needs of its inhabitants.

The well-sheltered bay offered good protection for ships coming to dock. Although its southern coast was bordered by mangrove swamps, there were areas such as Puerto Viejo (to the west) and Puerto Nuevo (to the east)² where sand dunes afforded enough dry ground for the construction of a pier.

The following are the most important points relevant to the selection of this particular site for the town of Caparra: 1) flat expanse of land with ample water and lumber resources; 2) proximity to the bay, granting the difficulty of the swampy terrain; 3) proximity to the major river beds of the Sibuco and Toa rivers, where mining and agricultural activities were undertaken; and 4) the locality offered good protection from Indian attacks (Freire, 1967). The possibility of utilizing Indian labor from the surrounding areas may have been another consideration.

The initial structures of the settlement were begun under the direction of Ponce de Leon, who drew the layout of the first streets (Tio, 1961, 1969;

Coll y Toste, 1922:73-101). There is specific evidence that the following structures were erected: 1) the church (Coll y Toste, 1922; 1959; Tio, 1969; Brau, 1966), 2) the hospital (Tio, 1969), 3) Ponce de Leon's house (de Hostos, 1938; Zeno, 1959), plus bohios for the Spanish settlers. A plaza was also built (Figueroa document of 1519³), as well as a smelting house (Brau, 1972: 190⁴). Roads and bridges were constructed around 1513, including a road that led to the small island of San Juan (Brau, 1966, 1972).

All structures were made of perishable materials except for Ponce de Leon's house which was begun in adobe and was continued in stone. So far, the only remains of the town which have been unearthed are the ruins of this fortress house (de Hostos, 1938). These were partially destroyed by the construction of road #2, and lie bordering the south gate of the Fort Buchanan military installation in Barrio Pueblo Viejo, Guaynabo.

The Spanish utilized Indian labor to build Caparra, presumably from groups living in surrounding areas (Tio, 1961⁵). There most probably were Indian villages, if not in the immediate vicinity of Caparra, at least close by, but none are specifically mentioned in the historical documents consulted.

The only concrete evidence that alludes to the propinquity of Indian villages to Caparra, appears in the Probanza de Juan Gonzales (Tio, 1961), where two of the witnesses testifying made reference to the existence of many Indian villages along the route leading to the area occupied by the town of Caparra.

Witness #1 - Andres Lopez

"...y visto este testigo como se partio el dicho Juan Gonzales Ponce de Leon con los veinte cristianos y con los yndios para yr a buscar la bahia y perto y visto este testigo como todo el camino que fueron todos los undios delos pueblos por donde yban los salian a rrecibir y sacar de comer y llevarles las camas y rropas que llevabamos y ansi nos llevaron por todo el camino hasta que allegamos ala bahia adonde esta agora el pueblo prinsipal dela dicha ysla san Juan sin que ningunos yndios los enojo sino que antes les dan delo que tenian y se holgavan

todos los caciques e yndios con el dicho Juan gonzalesponce de leon y con los xristianos y vista y sondada la dicha bahia y puerto y hallado y visto como hera muy buen puerta y hondable se tornaron por el miso camino que havian ydo y vido este testigo come estava muy polado de pueblos y muchos yndios." (Ibid.:48).

"y vido este testigo como el dicho capitán dixo al dicho Juan gonzalesponce de leon que bablase a todos acquellos caciques y senores que mandasen venir alli muchos yndios para que hiziesen el pueblo y las casas a los xristianos porque queria alli poblar e vido este testigo que desde a ocho dias estava rrecojida mucha cantidad de ynidios y el dicho capitán trazo luego el dicho pueblo y mando a los dichos caciques e yndios que hiziesen las casas a los dichos xristianos..."
(Ibid.:49).

Witness #2 - Francisco Rodriquez

"Fueron a la poblacion de Mabo del Grande y de alli tomo el dicho Juan gonzales veinte xristianos y a ciertos caciques y a muchos yndios y quattro maryneros a ver la dicha bahia y vido come por todo el camino que fuimos nos salian a rrecibir los caciques e yndios ... y ansi llegamos ala dicha bahia y entraron los maryneros en unas canoas y con sodas que llevaban las sondaron y atentaron en tres dias toda la boca de ancho y por toda la bahia adentro mas de dos leguas... y acabado de sondear el dicho puerto nos tornamos por el mismo camino y en una cabana que estara dos leguas del dicho puerto dixo el dicho Juan gonzalesponce de leon que nos aposentasemos como por todo el camino no avian hallado para adonde pudiese hazer el pueblo de los xristianos ni tenia tal proposito come aquella que vido este testigo por todo el camino avian muchos pueblos de yndios y vido como el dicho Juan Gonzalesponce de leon llevo consigo a ver al dicho capitán muchos caciques y principales." (Ibid.:70).

"los quattro marineros que se fuesen con los navios ala bahia dicha y luego nos partimos y por todo el camino salian yndios como hormigas..." (Ibid.:70).

These testimonies indicate that in this exploratory venture, Juan Gonzales parted from the town of Mabo el Grande, near Anasco (Tio, note 26, commentary to witness #2), and traversed the interior of the island. It seems that after crossing the Cordillera they arrived at the savannah area where Caparra was founded, and then continued toward the coast. After exploring the bay, they returned to Anasco and fetched Ponce de Leon, resuming their trek inland and at the same time sending the ships toward the bay. It is in reference to this trajectory that the witnesses mention seeing many Indian towns⁶.

Besides this document, there is also indirect evidence to this effect. The first conucos established by Ponce de Leon during the beginning of the colonization were located in the northeastern part of the island, and fell within the jurisdiction of the town of Caparra. Caciques and the Indians were conceded for mining and agricultural work, and at least five are mentioned by Ponce de Leon (Relacion a Ovando, 1508)⁷.

Ecological and geographical considerations also support the contention. Indian groups practicing agriculture would have had reason to settle in this area, because of the presence of river valleys (Manati Sibuco, Toa and Bayamon rivers), lumber resources, as well as the proximity of the coastal mangrove swamps rich in animal resources available for gathering.

THE DEVELOPMENT OF CAPARRA

Since the beginning of the establishment of Caparra⁸, the major interests of the Spanish settlers were the exploitation of the island's gold resources and the development of agriculture and animal husbandry. Mining estancias were begun in the Sibuco⁹ (Brau, 1966; Oviedo as cited in Fernandez Mendez, 1969).

Ponce de Leon also established farming areas (labranzas), one next to the town for the benefit of the settlers, and another adjacent to the Toa river about four leagues from Caparra for his own use and for the development of a Royal Farm (granjeria real) (Relacion a Ovando, 1508¹⁰). Furthermore,

he established another group of conucos which were auctioned to individual settlers. These were located in the following areas (information complied from Coll y Toste, 1914, and Murga Sanz, Historia documental de Puerto Rico, Vol.II, 1957):

1. Near the cacicazgo of Caguax, close to the Turbao river.
2. Near what is now Guaynabo, territory of the cacique Mabo.
3. In the Bayamon area, cacique Majagua.
4. In the Toa river valley, cacique Gonzalo de Aramana.
5. In the environs of Caparra.
6. Near the territory of cacique Canobana.
7. Near the Toa river, but belonging to the King of Spain (Royal Farm).

It is our contention that the area comprising the Manatubon, Sibuco, Toa, Bayamon and Loiza rivers formed part of the jurisdiction of Caparra. There were probably a small number of vecinos¹¹ who lived in the town itself, with the rest of the population scattered in the various estancias of the surrounding area. Brau, in his book La colonizacion de Puerto Rico (1966), stresses that the majority of the settlers preferred to live in their estancias, especially in the Toa and Sibuco areas. Tio (1969) points out that the people who actually resided in Caparra were the municipal and royal officials who were salaried workers. There were also vecinos who owned estancias in the rural areas, but these were usually administered by mayordomos¹². Also illustrative of this phenomenon is the statement of Ponce de Leon in 1519¹³ to the effect that only forty vecinos resided in the town as opposed to three hundred who lived in their estancias. This document reveals that the haciendas of the Toa and Bayamon rivers were the

- most important for Caparra. It was in the latter that the horse and cattle pastures were located, approximately one league from the town¹⁴.

THE INDIAN POPULATION OF CAPARRA

How was the indigenous population affected by these developments?

Initially, Ponce de Leon assigned five caciques to work along with their Indians in the Hacienda Real del Toa thus initiating the displacement of the Indian groups away from their areas of habitation¹⁵.

The first official repartimiento was carried out by Juan Ceron in 1509. A total of 5,500 Indians were involved in this repartimiento, 5,000 men and 500 women (Brau, 1972:158-59; Coll y Toste, 1922:342-49; Pereira, 1929; Murga Sanz, 1957; Fernandez Mendez, 1969:107-35; Caro, 1971:129-53). These refer to the entire island of San Juan, and obviously include only a fraction of the total Indian population at this time. Therefore, it is of no value in the consideration of the total native population in the Caparra area.

A glance through the Cedulas de Vecindad granted by the Crown to Spaniards settling in the island between the years 1509 to 1515, does not offer any additional information. Only a minimum number of cases specify the area of the island in which the vecindad is to be granted (Murga Sanz, 1961, Vol. I).

A second repartimiento was made by Miguel Diaz, four or five months after the first one (Murga Sanz, 1957), and a third one followed in 1511 (Coll y Toste, 1923:76-86) while the island was in the midst of an Indian rebellion.

The fourth repartimiento mentioned was carried out by Sancho Velasquez in 1515 and it involved a total of 4,000 Indians (Coll y Toste, 1923:171). The problem is that none of these repartimientos serve to document the Indian population of Caparra nor of the island in general, due to the discrepancies in sources and the lack of information concerning other Indians who were not subjected to the encomienda system¹⁶.

THE SPANISH POPULATION OF CAPARRA

The following is a summary of Spanish population according to our available sources:

<u>YEAR</u>	<u>POPULATION</u>	<u>SOURCE</u>
1508	50 persons	Coll y Toste, 1914
1509	Ponce de Leon, family + 100 settlers	Mayoral Barnes
1510	300 persons	Brau, 1966
1511	Caparra only town on island	Brau, 1972
1515	35 families (i.e 175 persons)	S. Velazquez, in Coll y Toste, 1914
1519	40 vecinos + 300 who live in their farms (i.e. 200 in town + 300 in farms = 500 persons)	Testimony of Ponce de Leon 17
1520	300 persons	Freire, 1967

This curve is inconsistent with what is known about the history of this town between the years 1510 and 1519. Contrary to what is illustrated here, one would expect an increase in population between 1510 and 1515, when there was a legislation fomenting the general development of the island, especially with regard to agriculture and construction¹⁸. On the other hand, despite the above, there is the fact that in 1513 Caparra was burned in a (supposedly) Carib Indian attack. This occurred between June 2nd and July 31st in 1513, and 29 dwellings were burned, plus ornaments, books, the church and the bishop's house (Murga Sanz, 1959:133). This fact is not mentioned in most historical sources, but it is spoken of by the two witnesses in the Probanza de Juan Gonzalez and in the documents of the Royal Treasury¹⁹. This incident may account for the decrease in population between the years 1510 and 1515.

The increase in population between the years 1515-19 also needs to be considered, since it was during this time that the controversy over the removal of the city to its present location gained in interest and was finally resolved²⁰. It seems unlikely that the population of the town should increase during this period.

These discrepancies may be resolved and a smoother population curve might emerge if one were to consider the possibility that these figures are inconsistent regarding the city and the rural population. We have already discussed the fact that many settlers did not live within the town limits but inhabited their rural farms. In addition, these figures (especially Velaquez' count of 1515) consider the settlers who had been privileged enough to acquire vecindades²¹. It is possible that Velazquez only considered the urban vecinos in his 1515 estimate, since he specifically states that there were 35 families residing in each town (there were only two: Caparra and San German). Ponce de Leon, though, specifically mentions vecinos and personas. Since his statement was not official and it was to his advantage to exaggerate his estimate (he was the only one against the transferral of the town), it is possible that his figure is inflated.

Nevertheless the population of Caparra was not particularly prosperous towards the year 1519. No permanent dwellings had been built, and there were many requests that the town be moved to the small island of San Juan.

One of the major problems which confronted the townspeople was transportation. Although the villa had at least three paths leading out of it (de Hostos, 1938; Zeno, 1959; Ponce de Leon's 1519 testimony), these were difficult to traverse. The paths toward the coast, both the one to the old pier, desembarcadero de Pueblo Viejo, which was later abandoned, and the one to the new pier, the desembarcadero de Pueblo Nuevo, were often intransitable because of the surrounding swamps. The road to the agricultural and mining areas was also difficult (Zeno, 1959; Brau, 1966). The settlers complained that the cost of transporting merchandise from the pier to the town was more than from Seville to San Juan. This was viewed as an unnecessary economic burden since it could be avoided by moving the city to the islot, close to the ships and on high ground²². When Lcdo. Figueroa came in 1519 to hear testimony about this matter, everyone favored it except Ponce de Leon. The need for more efficient commercial arrangement prevailed over the previous advantage of the Caparra site, which was its proximity to the agricultural and mining lands.

Caparra survived for twelve years (1508-1521) as capital of the island of San Juan. It served as the administrative center of the island and had jurisdiction over a small but widespread rural population. Once it was abandoned, it seems to have sunk into oblivion, since there is an almost complete lack of information pertaining to this area after 1521. Practically all that is said about it is that towards the end of the sixteenth century there was one sugar mill in the vicinity of where the villa had stood (Relacion de Melgarejo 1589, in: Caro, 1971:129-53; Ferandez Mendez, 1969:107-35; Coll y Toste, 1926:65-71). There were still farms on the Toa, Bayamon and Loiza rivers toward the end of the century (Coll y Toste, 1926:70). The estancias around the Sibuco and Manati rivers were depopulated at this time (Relacion de Melgarejo 1589, in Ferandez Mendez, 1969:107-35).

Nevertheless, these rural areas continued to be important for the new city of San Juan, judging from a 1529 letter of the Bishop of Hispaniola to the King, where he mentions that there were no farms in the small island of San Juan²³. Therefore, areas which had been farm lands prior to the transferral of the town must have continued to be the source of sustenance for the San Juan population.

CONCLUSIONS

Historical data relevant to the study of the development of the Caparra settlement is, admittedly, very sparse. Maps and/or plans showing the extent of the urban settlement and its relationship to neighboring areas are lacking, as well as Crown specifications concerning its constructions and layout²⁴. The only map we have located is the 1519 sketch of the bay made by Lcdo. Figueroa²⁵.

Despite the above, the information compiled here permits us to formulate some definite statements. There must have been a considerable Indian population in the area surrounding Caparra, both in the hills and in the river valleys to the east and west, since we have reference to the fact that these Indian groups were forced to labor in the construction of Caparra, and in the agricultural and mining estancias.

Although we do not know the extent of the urban settlement, we do know that its rural jurisdiction extended four leagues to the north and west, to include the Toa river farms. If this was the case, then what was the relationship between Caparra and the area now occupied by Buchanan? The present day ruins of Ponce de Leon's house lie adjacent to the Fort Buchanan South Gate. Did the urban settlement extend into the southeastern part of Buchanan (north of the present ruins), or was it oriented southwest of the ruins? Were the farm lands near Caparra located to the northeast or southwest of the town?

These questions cannot be answered without a knowledge of the topography of the area prior to the construction of the Fort Buchanan facilities. We were

unable to locate any maps older than ten to fifteen years ago, and no information pertaining to the earliest phases of construction in the Buchanan area. While in Buchanan, we consulted with the following persons: Sgt. Jiminez and Sgt. Lowe from the CPTS building where some historical files are kept; Mr. Robert Rourke, Ms. Griselle Torres, Mr. Pedorsa, Edward K. Draper, and Lt. Col. Edward Jankiewicz, all in the Engineers Facilities Building. To their knowledge, no specific documented information is available.

Nevertheless, they did venture some information based on their own impressions and memories about Fort Buchanan. According to Mr. Draper and Mr. Pedrosa, most of the valley area now occupied by Buchanan was originally marshland, which was drained prior to construction of Fort Buchanan installation. If this is true, there would not have been any flat, dry area of considerable dimensions within Buchanan suitable for Indian or Spanish habitation. This would imply that the savannah area occupied by Caparra extended to the southeast of the present ruins, since the marshlands to the northwest were unsuitable for these purposes. It is known that prior to modern construction, the area to the south and east of Caparra was exploited as pasture. If this information is correct, the priority areas for the archaeological survey would include the hills to the west, southwest, southeast and northeast of Buchanan, and not the central and southern valleys.

In order to document this point, we searched for old maps indicating the extent of marshlands in this area. We came across a 1933 U.S.C.&G.S. map of the San Juan harbor²⁶, where these swamp areas are clearly defined. A comparison of this map with a 1957 U.S.G.S. map of San Juan vicinities reveals important information.

According to these maps, Caparra would have been located between Margarita and Santa Catalina creeks. The area now known as Caparra Terrace is east of Barroco creek, and was originally a mangrove zone. The area north of what is now Pueblo Viejo (Montes de Canejo) was also a swamp. Moving southward past the Montes de Canjo, to the Montes de Santa Ana and the lower hills which lie to the east of Santa Ana between the two creeks²⁷, there was

no swamp. This was a valley area, flanked by hills to the north, northwest and northeast. This fits the early sixteenth century Spanish descriptions of where Caparra was founded: in a flat expanse of land, drained by three creeks and surrounded by hills.

How does this relate to the present area occupied by Buchanan? There seems to be some discrepancy between the 1933, 1957 and modern maps with respect to the exact location of Buchanan in relation to the hills and valley areas adjacent to Caparra. It is our opinion (which is based on the study of these maps) that the area of Buchanan was probably hillier originally; it definitely was not marshland. The marshlands would have been located to the north (in the direction of Catano) where the Buchanan Military Residences used to be (according to the 1957 map). The southern valley section was not a swampy area.

What, then, was the relationship between Caparra and the area which is presently part of Buchanan? Their proximity suggests that the entire area not occupied by the Fort Buchanan military installation was part of this town's jurisdiction.

The historical data that we have presented in this section, coupled with what we know about the topographic features and environment of the Caparra and Buchanan area lead us to believe that there must have been a large Indian population either here or close by, and that this area constituted an important part (rural or urban) of the Caparra settlement.

There are very large gaps in the historical record, and archaeological research was viewed as a vehicle for obtaining new information and interpreting existing historical records. Problems dealing with questions such as: 1) what was the Indian population of this area at the time of contact and how was it affected by the development of Caparra? 2) what was the relationship between the Indian settlements and the Spanish town? 3) what

was the extent of the Caparra settlement and how did its population utilize the available resources? 4) can a transculturation period be defined for this area?, and others which cannot be answered using historical sources. They can begin to be answered by archaeological research. The location of new sites and the excavation of known sites in the area should be and are oriented towards answering specific problems such as the ones mentioned above.

FOOTNOTES

1. 1 league - slightly less than three miles. There are 5,070.52 yards in league (see de Hostos, 1938:24). There is a discrepancy here with the testimonies given in the Probanza de Juan Gonzalez, where it is stated that the town was located 2 leagues from the bay (see pp. 49,70).
2. See de Hostos' map, 1938, pg. 24.
3. This document is reproduced in, Coll y Toste, BHPR. Vol. III, pg. 82-113. Also in Caro, 1971, pp. 97-105.
4. The first smelting in San Juan was in 1510. See A. Tapis y Rivera, 1945, pg. 154.
5. Indian labor was later utilized for the construction of a hospital and roads. In 1513, 100 Indians were given to the Council of Caparra for these purposes (see Brau, 1966).
6. In pg. 171, note 34, Tio emphasizes the statement made by the two witnesses regarding the existence of a document prepared by Gonzales: "J. Gonsalez preparo un detalle escrito de la exploracion; mapas del puerto, localizacion de la sabana, pueblo indios en el camino con el numero de casas, calculo de la poblacion indigena, etc." Unfortunately, this document has been lost.
7. In: Bague, J., 1961, pp. 73-76; Coll y Toste, BHPR, Vol. I, 1914, pp. -19-121.
8. In the year 1513, Caparra was officially granted the name of City of Puerto Rico by Bull of Pope Julio III (Brau, 1966).
9. Vega Baja river (Coll y Toste, 1922:277).

10. Bagué and Coll y Toste, op cit, note 6.
11. A vecino is a head of a family of five.
12. An example of this is the fact that in 1519, in the vicinity of Toa, at least 17 landowners were mentioned in the convocation to appear in the Impeachment Trial of Sancho Velaquez. These were communicated in the main to the mayordomos, and not to the actual owners. See Murga Sanz, 1957, Vol. II, pp. 20-22.
13. In "Informacion Fecha por el Lcdo Rodrigo de Figueroa en la Ysla de Puerto Rico, sobre mudar el asiento", Coll y Toste, op cit, note 3.
14. Testimony of Diego Arias Davila, vecino of the city, ibid.
15. Coll y Toste, op cit, note 6.
16. Nevertheless, the 1515 repartimiento yields a total of around 2,700 Indians for the Caparra area.
17. Coll y Toste and Caro, op cit, note 3.
18. See the Disposiciones Reales of the 28th of February, 1510 and the 26th of February, 1511 in: Perea, 1929, and see Brau, 1966, for the 1513 Royal Ordinances.
19. Probanza de Juan Gonzalez, in Tio, 1961, pp. 31-109. Documentos de la Real Hacienda, in Tanodi, 1971, Vol. I, Part I, pg. 37.
20. In 1513 the movement of Caparra was prohibited. See Brau, 1966, pp. 178-79.

In 1515, settlers again petition movement. See Brau, 1966.

In 1519, Lcdo. Figueroa's inquiry. See Coll y Toste, op cit, note 3.

21. Compare these figures with the 1930 census of the city of San Juan, in Coll y Toste, 1926, pg. 66.
22. See Lcdo. Figueroa's document in: Caro, op cit, note 3, and Coll y Toste, op cit, note 3.
23. Coll y Toste, 1918, pp. 28-30.
24. See Murga Sanz, 1961, pg. XXVII.
25. Rodriguez Villafane's (1966) search of the Archival records in Seville for maps and plans pertaining to Puerto Rico yielded no additional information concerning Caparra.
26. This is the map from which de Hostos based his. See de Hostos, 1938, plan no. 3, pg. 24 (front).
27. This was before the Santa Catalina creek was canalized. It now runs through Buchanan.

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APPENDIX F

THE TWENTIETH CENTURY COMPILATION
OF
TITLES FOR FARMS NOW THE PROPERTY
OF
THE UNIVERSITY OF PUERTO RICO,
USED BY THE AGRICULTURAL EXPERIMENT STATION,
RIO PIEDRAS, PUERTO RICO

COMPILED BY THE AGRICULTURAL EXPERIMENT STATION,
RIO PIEDRAS, PUERTO RICO

Historial de las fincas propiedad de la Universidad de Puerto Rico, usadas por la Estacion Experimental Agricola en Rio Piedras, Puerto Rico.

FILE #40

Finca "Robledo", #8519 (antes #1014), de 43.3112 cuerdas en el barrio Monacillos de Rio Piedras.

FILE #40A

Finca "Mariana", #322, de 168.95 cuerdas, en barrio Puente de Rio Piedras.

FILE #51

Finca "Solis", #13936 (antes #20) de 66.062 cuerdas, en barrio Monacillos de Rio Piedras.

FILE #53

Finca "Union", #946 de 51.9575 cuerdas, en barrio monacillos de Rio Piedras.

FILE #40

Inscripcion Ira.

Folio 210 del Tomo 18 de Rio Piedras.

Finca compuesta de 50 cuerdas, por argupacion de la Finca #938 con 45 cuerdas (remanete), inscritas en el Folio 246 del Tomo 16 de Rio Piedras y 5 cuerdas, inscritas en el Folio 193 del Tomo 18 de Rio Piedras.

Vendida don Francisco Robredo Garcia por don Francisco Solis Amy (hijo de don Joaquin Leandro Solis)

Colindancias:

NORTE: Rio Piedras
ESTE : Rio Piedras
SUR : Miguel Emmanuelli
OESTE: Maria Solis

Segun Segun Escritura #9 de 14 enero de 1907 ante el Notario Francisco Socorro Ramos.

Inscripcion 2da.

Folio 212 del Tomo 18 de Rio Piedras

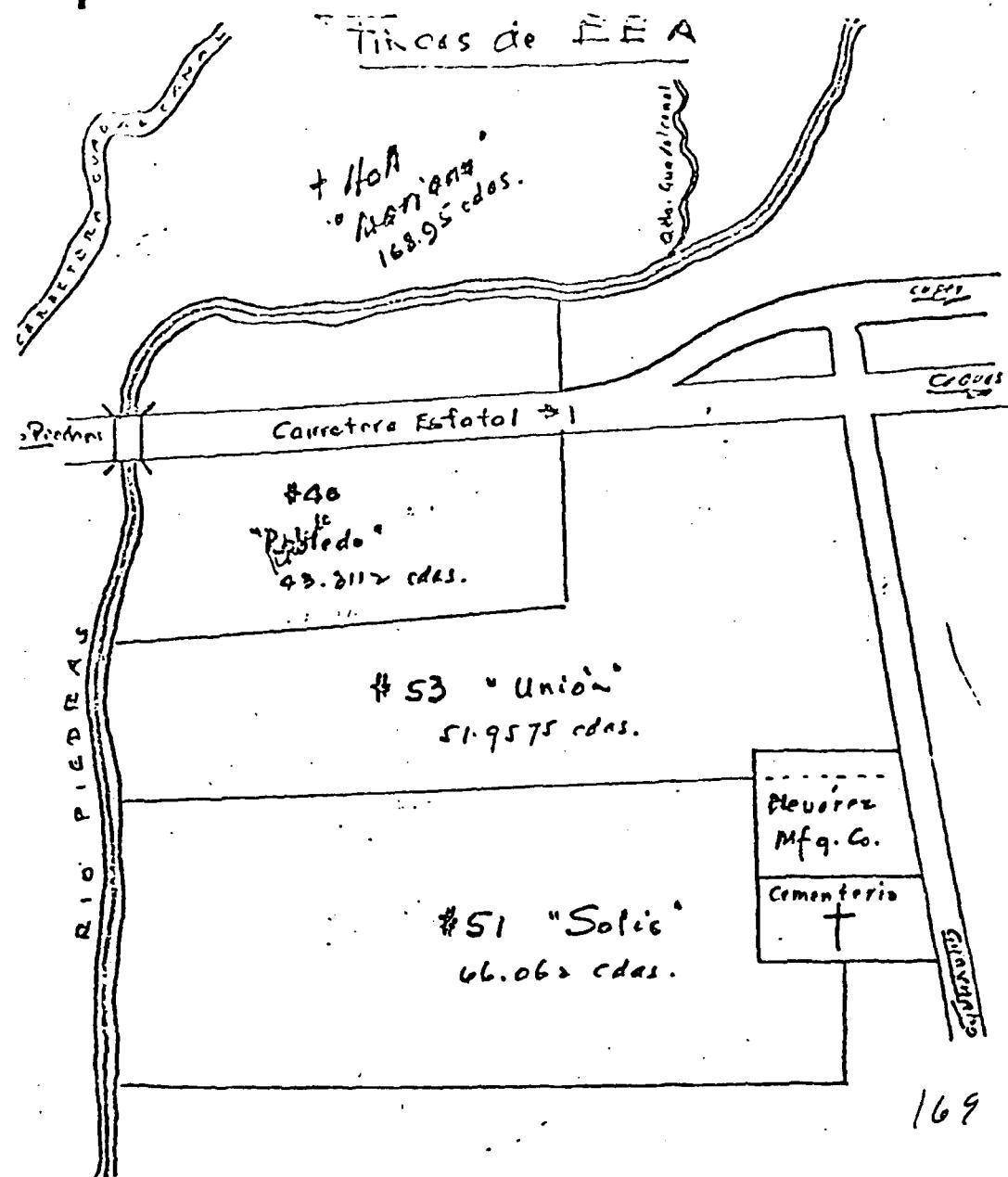
Finca descrita, con cabida de 44.32 cuerdas, habiéndose segregado 20,639 metros cuadrados (5.10 cuerdas), vendidos a J. G. White & Co., para la Cagus Tramway Co., que atraviesa la finca , lo mismo que la Carretera Central (#1).

La colindancia Sur varia, siendo ahora con do Miguel Emmanuelli y con don Santiago F. Lorenzi, separados por la Carretera Central (#1).

Nota Marginal

La segregacion de la parcela vendida a J. G. White & Co., fue de 24,650metros cuadrados (6.2698 cuerdas), siendo la cabida actual de 43.1592 cuerdas.

Don Francisco Robledo Garcia le vende a la Asociacion de Productores de Azucar de Puerto Rico, representada por su Presidente don Ramon Aboy Benitez, por la cantidad de \$35,617.50, junto con otra finca, segun Escritura # (sic) de 25 de julio de 1910, ante el Notario Francisco Soto Gras.



Area Total .. 334.01 cuerdas

FILE #40A

FINCA #322

Inscripcion 14a.

Folio 219 del Tomo 25 de Rio Piedrea (Norte).

Estancia "Mariana", con cabida de 171.12 cuerdas, en Bo. Puente de la Municipalidad de Rio Piedras, traspasada a El Pueblo de Puerto Rico por cesion de la Asociacion de Productores de Azucar de Puerto Rico representada por su Presidente don Ramon Aboy Benitez, segun Escritura #59 en 10 de septiembre de 1914 ante el Notario Jorge V. Dominguez.

Inscripcion 15a.

Folio 92 del Tomo 108 de Rio Piedras (Norte).

Traspasada a la Universidad de Puerto Rico por el Comisionado de Agricultura y Comercio de Puerto Rico, don Rafael Menendez Ramos, segun Escritura #4 en 19 marzo de 1934 ante el Notario Manuel Cruz Horta.

Inscripcion 16a.

La Universidad de Puerto Rico le arrienda a Tropical Forest Experimental Station U.S. Department of Agriculture una parcela con cabida de 5.24 cuerdas por 50 anos, segun Escritura #32 en 28 de noviembre de 1941 ante el Notario Jose F. Camunas.

Inscripcion 17a.

Folio 94 vto. del Tomo 108 de Rio Piedras (Norte).

Servidumbre de 1,759.75 metros cuadrados, a favor de Estados Unidos de America, para la instalacion de una tuberia de agua, inscrita el 26 de julio de 1944. Colindancias: Por el Norte y Sur, con terrenos de la Universidad de Puerto Rico; por el Este, con Jose Rodriguez Collazo; por el Oeste con Central San Jose, Inc.

Inscripcion 18a.

Folio 85 del Tomo 243 de Rio Piedras (Norte).

Dos (2) servidumbres de 4.0 metros cuadrados cada una, favor de Estados Unidos de America, para la instalacion de tuberia de agua, inscrita el 12 de abril de 1948. Colindando con terrenos de la Universidad de Puerto Rico por los cuatro lados.

Inscripcion 19a.

Traspaso de servidumbre segun Inscripciones 17a. y 18a., de Estados Unidos de America a Servicio de Acueductos y Alcantarillados de Puerto Rico mediante Escritura #31 en 28 de octubre de 1948 ante el Notario Miguel Parga.

FILE #40A(2)

Inscripcion 20a.

Servidumbre de faja de terreno de 5.0 metros de ancho y 400.46 metros de largo a favor de la Autoridad de Acueductos y Alcantarillados de Puerto Rico, segun Escritura #11 en 14 de junio de 1962.

Nota:

Se describe la finca con cabida de 168.95 cuerdas y las siguientes colindancias:

NORTE: Ramon Santa (antes Juan Elias Cruz) Manuel Perez y Gobierno de la Capital

ESTE : Gobierno de la Capital (camino Guadalcanal) y Ramon Roig (antes Jose Acosta)

Sur : Quebrada Guadalcanal y Monrique Cabrera

Oeste: Estacion Experimental Agricola y Arturo Roque (antes Central Vannina) y canal de Rio Piedras.

Segregacion

Se segregan 2.1665 cuerdas, inscritas en el Folio 243 del Tomo 578 de Tio Piedras (Norte), Finca #8,654, Inscripcion la. con las siguientes colindancias:

Norte: Sucesion Vicente Lopez, Felix Sandoval, Carlos Rivera Berrios, Modesto Cotto, Ramon Cuadrado y Estacion Experimental Agricola

Este: Carretera Guadalcanal

Sur : Estacion Experimental Agricola

Oeste: Estacion Experimental Agricola

Esta parcela le fue traspasada al gobierno de la Capital para la construcion de una Escuela Elemental, segun Escritura #93 en 14 de julio de 1945 ante el Notario Luis F. Sanchez Vilella.

Nota: Esta finca esta afectada por tres (3) censos, segun Inscripcion 4a. al Folio 97 del Tomo 7 de Rio Piedras.

1. \$1,740 a favor de la Capellania Vacante
2. \$ 950 a favor de Cabildo Eclesiastico

3. \$ 750 a favor de Parroquia de Santurce.

FILE #51

Finca 13936 (antes #20)

Folio 82 del Tomo 146 de Rio Piedras

Inscripcion 1a.

Finca con cabida de 66.062 cuerdas, formada por agrupacion de la Finca #501 (Folio 40 vto. del Tomo 84 de Rio) y Finca #4633 (Folio 108 del Tomo 87 de Rio Piedras).

Colindancias:

Norte: Rio Piedras, que separa terrenos de Manual Rodriguez Gonzalez, (hoy Urbanizacion Jardines Metropolitanos).

Este: Rafael Villamil

Sur : Cementerio Municipal, Urbanziacion #21 (Rio Piedras-Guaynabo) y Rafaela Patron de Castrillo (hoy Villa Nevarez)

Oeste: Rafaela Patron de Castrillo (hoy Urbanizacion Villa Nevarez)

Vendido por la Sociedad Agricola de Rio Piedras a la Universidad de Puerto Rico por la cantidad de \$23,914.00 mediante Escritura #80 del 25 de abril de 1941 ante el Notario Damian Monserrat Suro.

Inscripcion 2a.

Arrendamiento de dos parcelas de 5.89 cuerdas y 5.74 cuerdas, respectivamente, a la Pan American Airways para estacion de radio y direccion, segun Escritura #1 del 30 de diciembre de 1942 ante el Notario Pedro Juvenal Rosa.

Inscripcion 3a.

Se inscriben edificaciones construidas en dichas fincas mediante Escritura #4 del 22 de marzo de 1949, ante el Notario Jose L. Novas.

Inscripcion 4a.

Se extiende contrato entre UPR y PAA hasta el 30 de diciembre de 1961, mediante Escritura #26 del 8 de septiembre de 1952 ante el Notario Luis A. Estades.

PAA Sub-arrienda a Aeronautical Radio Inc.

Nota:

El historial de esta finca es transferido al Folio 245 del Tomo 366 de Monacillos (Seccion III de Rio Piedras) asignandosele el numero Finca #13,936.

FILE #53

Folio 176 del Tomo 340 de Rio Piedras, Finca #946

Inscripcion 9a.

Finca "Union", compuesta de 51.9571 cuerdas

Colindacias:

Norte: Rio Piedras y terrenos de la Estacion Experimental Agricola.

Este : Terrenos de la Estacion Experimental Agricola

Sur : Terrenos de la Estacion Experimental Agricola y Carretera #1

Oeste: Terrenos de la Estacion Experimental Agricola y Cementerio Municipal.

Esta finca se halla afectada a dos censos por su procedencia; una por \$300 a favor del Convento de Predicadores (hoy del Estado) y el otro, por \$300 a favor de Archicofradia del Santisimo Rosario, relacionados en la Inscripcion la. anterior.

Expropiado por el Pueblo de Puerto Rico segun Caso #116 del Tribunal de Expropriaciones de Puerto Rico en resolucion el Iro. de agosto de 1948, por la cantidad de \$30,025.

Inscripcion 10a.

Folio 178 del Tomo 340 de Rio Piedras

El Pueblo de Puerto Rico paga \$40,000 adicionales y traspasa la finca a la Universidad de Puerto Rico al 10 de marzo de 1952.

Segregaciones

1. Finca #12,525

Folio 56 del Tomo 504 de Rio Piedras

Parcela de 10,230.81 metros cuadrados, el 9 de julio de 1952 para la compania de Fomento Industrial (Nevares Mfg. Co.).

2. Finca #15,526

Folio 1 del Tomo 412 Monacillos, Inscripcion la.

P Parcela de 1,100.32 metros cuadrados (Parcela #1 del Plano de permuta preparado por Figueroa & Rodriguez Inc., el 20 de diciembre de 1957), traspasada al Estado Libre Asociado de Puerto Rico segun

Escriptura #44 del 4 de septiembre de 1958 ante el Notario Marcos A. Ramirez.

Colindancias:

Norte: Parcela #4 y cauce del rio Piedras

Este : Parcela #1

Sur : Finca Principal

Oeste: Parcela #2

3. Finca #15,527

Folio 7 del Tomo 412 de Monacillos, Inscripcion la.

Parcela de 1.860.12 metros cuadrados (Parcela #1A del plano de permuta preparado por Figueroa & Rodriguez Inc., el 20 de diciembre de 1957, traspasado al Estado Libre Asociado de Puerto Rico segun Escriptura #44 del 4 de septiembre de 1958 ante el Notario Marcos a Ramirez.

Colindancias:

Norte: Parcela 4A

Este : Margen sur del Rio Piedras

Sur : Finca Principal

Oeste: Parcela #1

4. Finca #15,528

Folio 15 del Tomo 412 de Monacillos, Inscripcion la.

Parcela de 46.87 metros cuadrados (Parcela #4 en el referido plano), cedida a Mirtos Realty Corporation, representada por el Sr. Pedro Virella Rojas, con valor de \$1 por metro, segun Escritura 44 del 4 de septiembre de 1958 ante el Notario Marcos A. Ramirez y el Certificado del 25 de febrero de 1959 de la Junta de Planificacion de Puerto Rico.

Colindancias:

Norte: Margen sur del viejo cauce del Rio Piedras (Parcela #3 en el referido plano)

Noroeste: Parcela #4A

Suroeste: Margen norte del nuevo canal (Parcela #1)

5. Finca #15,529

Folio 22 del Tomo 412 de Monacillos, Inscripcion la.

Parcela de 1.710.18 metros cuadrados (Parcela #4A en el referido plano), cedida a Mirtos Realty Corporation, representado por el St. Pedro Virella Rojas, con valor de \$1 por metro, segun Escritura #44 del 4 de septiembre de 1958 ante el Notario Marcos A. Ramirez.

Colindancias:

Norte: Margen sur del viejo cauce del rio Piedras (Parcela #3a en el referido plano)

Este : Margen sur del viejo cauce del rio Piedras (Parcela #3A en el referido plano)

Suroeste: Margen norte del nuevo canal (Parcela #1A)

Oeste: Parcela #4

Nota:

Las Fincas #15,528 y 15,529 han sido agrupadas en la Sección II radicado únicamente en el barrio Hato Rey, al Folio 140 del Tomo 674 de Rio Piedras Finca #19,121, Inscripción la.

Observaciones:

1. La Mirtos Realty Corporation construyó en estos terrenos la Urbanización Jardines Metropolitanos. Entre dos se encuentran?

Eladio Rodríguez Otero - Vice Presidente
Henry Rodríguez Otero - Director Ejecutivo
Abraham Díaz González
Pablo M. García Rodríguez
José Quinones Elías
Marcos A. Ramírez

2. La compra venta de las fincas #15,528 y 15,529 fueron aprobadas por las Certificaciones del Consejo de Educación Superior #60 y #90 del 23 de enero de 1958 y abril 1958, respectivamente. Para ese tiempo los miembros del Consejo de Educación Superior eran:

Dr. Efraín Sánchez Hidalgo, Secretario
Departamento de Instrucción Pública
Lic. Gustavo Agrait
Dr. Adolph Berle, Jr.
Dr. Roberto Buso
Lic. Manuel García Cabera
Dr. Lindsay Rogers
Lic. Jaime Sifre

FILE #51

Finca #13936 (antes #20)

Folio 82 del Tomo 146 de Rio Piedras

Inscripcion 1a.

Finca con cabida de 66.062 cuerdas, formada por agrupacion de la Finca #4501 (Folio 40 vto. del Tomo 84 de Rio) y Finca #4633 (Folio 108 del Tomo 87 de Rio Piedras).

Colindancias:

Norte: Rio Piedras, que separa terrenos de Manuel Rodriguez Gonzales, (hoy Urbanizacion Jardinez Metropolitanos).

Este : Rafael Villamil

Sur : Cementerio Municipia, Carretera #21 (Rio Piedras-Guaynabo) y
Rafaela Patron de Castrillo (hoy Urbanizacion Villa Nevarez)

Oeste: Rafaela Patron de Castrillo (hoy Urbanizacion Nevarez)

Vendido por la Sociedad Agricola de Rio Piedras a la Universidad de Puerto Rico por la cantidad de \$23,914 mediante Escritura #80 del 25 de abril de 1941 ante el Notario Damian Monserrat Suro.

Inscripcion 2a.

Arrendamiento de dos parcelas de 5.89 cuerdas y 5.74 cuerdas, respectivamente, a la Pan American Airways para estacion de radio y direccion, segun Escritura #41 del 30 de diciembre de 1942 ante el Notario Pedro Juvenal Rosa.

Inscripcion 3a.

Se inscriben edificaciones construidas en dichas fincas mediante Escritura #4 del 22 de marzo de 1949, ante el Notario Jose L. Novas.

Inscripcion 4a.

Se extiende contrato entre UPR y PAA hasta el 30 de diciembre de 1961, mediante Escritura #26 del 8 de septiembre de 1952 ante el Notario Luis A. Estades.

PAA Sub-arrienda a Aeronautical Radio Inc.

Nota:

El historial de esta finca es transferido al Folio 245 del Tomo 366 de Monacillos (Seccion III de Rio Piedras) asignandosele el numero Finca #13,936.

Observaciones:

1. La Mirtos Realty Corporation construyo en estos terrenos la Urbanizacion Jardines Metropolitanos. Entre los directores y accionistas se encuentran?

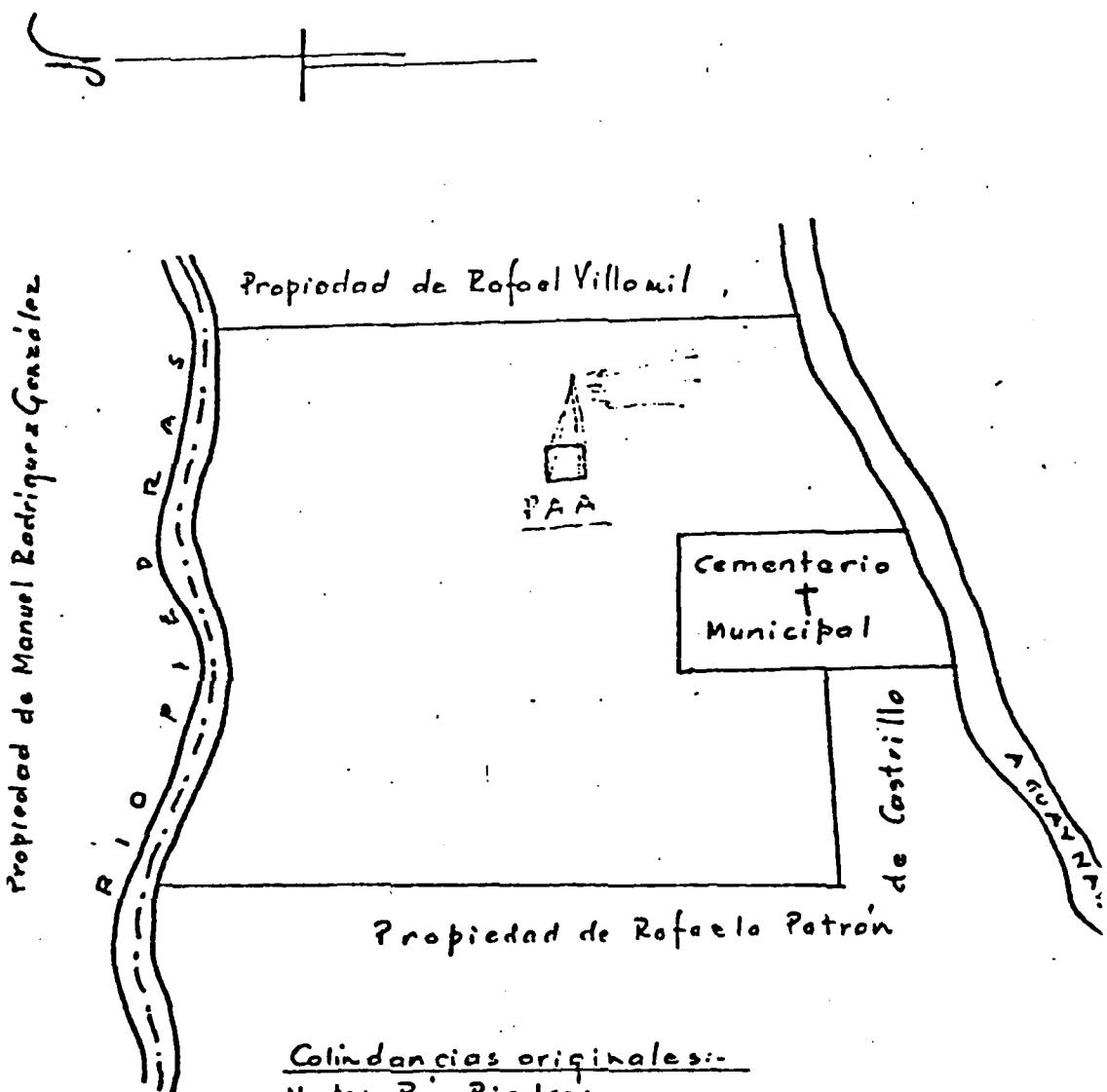
Eladio Rodriguez Otero - Vice Presidente
Henry Rodriguez Otero - Director Ejecutivo
Abraham Diaz Gonzalez
Pablo M. Garcia Rodriguez
Jose Quinones Elias
Marcos A. Ramirez

2. La compra venta de las fincas #15,528 y 15,529 fueron aprobadas por las Certificaciones del Consejo de Educacion Superior #60 y 90 del 23 de enero de 1958 y 25 de abril de 1958, respectivamente. Para

TITLE # 5.

Cobida ~ 66.62 cuerdas

Finca "Solis"



Colindancias originales:-

Norte: Rio Piedras

Este: Rafael Villamil

Sur: Cementerio Municipal, Carr. Rio Piedras -

Quaynabod Rafael Patron de Castrillo

Oeste: Rafael Patron de Castrillo

ese tiempo los miembros del Consejo de Educacion Superior eran:

Dr. Efrain Sanchez Hidalgo, Secretario
Department de Instruccion Publica
Lic. Gustavo Agrait
Dr. Adolph Berle, Jr.
Dr. Roberto Buso
Lic. Manuel Garcia Cabrera
Dr. Lindsay Rogers
Lic. Jaime Sifre

3. Finca #15,527

Folio 7 del Tomo 412 de Monacillos, Inscripcion la.

Parcela de 1a.860.12 metros cuadrados (Parcela #1A del plano de
permuta preparado por Figueroa & Rodriguez Inc., el 20 de diciembre
de 1957, traspasado al Estado Libre Asociado de Puerto Rico segun
Escritura #44 del 4 de septiembre de 1958 ante el Notario Marcos a
Ramirez.

Colindancias:

Norte: Parcela 4A
Este : Margen sur del Rio Piedras
Sur : Finca Principal
Oeste: Parcela #1

4. Finca #15,528

Folio 15 del Tomo 412 de Monacillos, Inscripcion la.

Parcela de 46.87 metros cuadrados (Parcela #4 en el referido
plano), cedida a Mirtos Realty Corporation, representada por el Sr.
Pedro Virella Rojas, con valor de \$1 por metro, segun Escritura 44

del 4 de septiembre de 1958 ante el Notario Marcos A. Ramirez y el Certificado del 25 de febrero de 1959 de la Junta de Planificacion de Puerto Rico.

Colindancias:

- Norte: Margen sur del viejo cauce del Rio Piedras (Parcela #3 en el referido plano)
Noroeste: Parcela #4A
Suroeste: Margen norte del nuevo canal (Parcela #1)

5. Finca #15,529

Folio 22 del Tomo 412 de Monacillos, Inscripcion la.

Parcela de 1.710.18 metros cuadrados (Parcela #4A en el referido plano), cedida a Mirtos Realty Corporation, representado por el Sr. Pedro Virella Rojas, con valor de \$1 por metro, segun Escritura #44 del 4 de septiembre de 1958 ante el Notario Marcos A. Ramirez.

Colindancias:

- Norte: Margen sur del viejo cauce del rio Piedras (Parcela #3A en el referido plano)
Este : Margen sur del viejo cauce del rio Piedras (Parcela #3A en el referido plano)
Suroeste: Margen norte nuevo canal (Parcela #1A)
Oeste: Parcela #4

Nota:

Las Fincas #15,528 y 15,529 han sido agrupadas en la Seccion II radicado unicamente en el barrio Hato Rey, al Folio del Tomo 674 de Rio Piedras Finca #19,121, Inscripcion la.

File #53

Folio 176 del Tomo 340 de Rio Piedras, Finca #946

Inscripcion 9a.

Finca "Union", compuesta de 51.9571 cuerdas

Colindancias:

Norte: Rio Piedras y terrenos de la Estacion Experimental Agricola.

Este : Terrenos de la Estacion Experimental Agricola.

Sur : Terrenos de la Estacion Experimental Agricola y Carretera #1.

Oeste: Terrenos de la Estacion Experimental Agricola y Cementerio Municipal.

Esta finca se halla afectada a dos censos por su procedencia; una por \$300 a favor del Convento de Predicadores (hoy del Estado) y el otro, por \$300 a favor de Archicofradia del Santisimo Rosario, relacionados en la Inscripcion la. anterior.

Expropiado por el Pueblo de Puerto Rico segun Caso #116 del Tribunal de Expropriaciones de Puerto Rico en resolucion el lro. de agosto de 1948, por la cantidad de \$30,025.

Inscripcion 10a.

Folio 178 del Tomo 340 de Rio Piedras

El Pueblo de Puerto Rico paga \$40,000 adicionales y traspasa la finca a la Universidad de Puerto Rico al 10 de marzo de 1952.

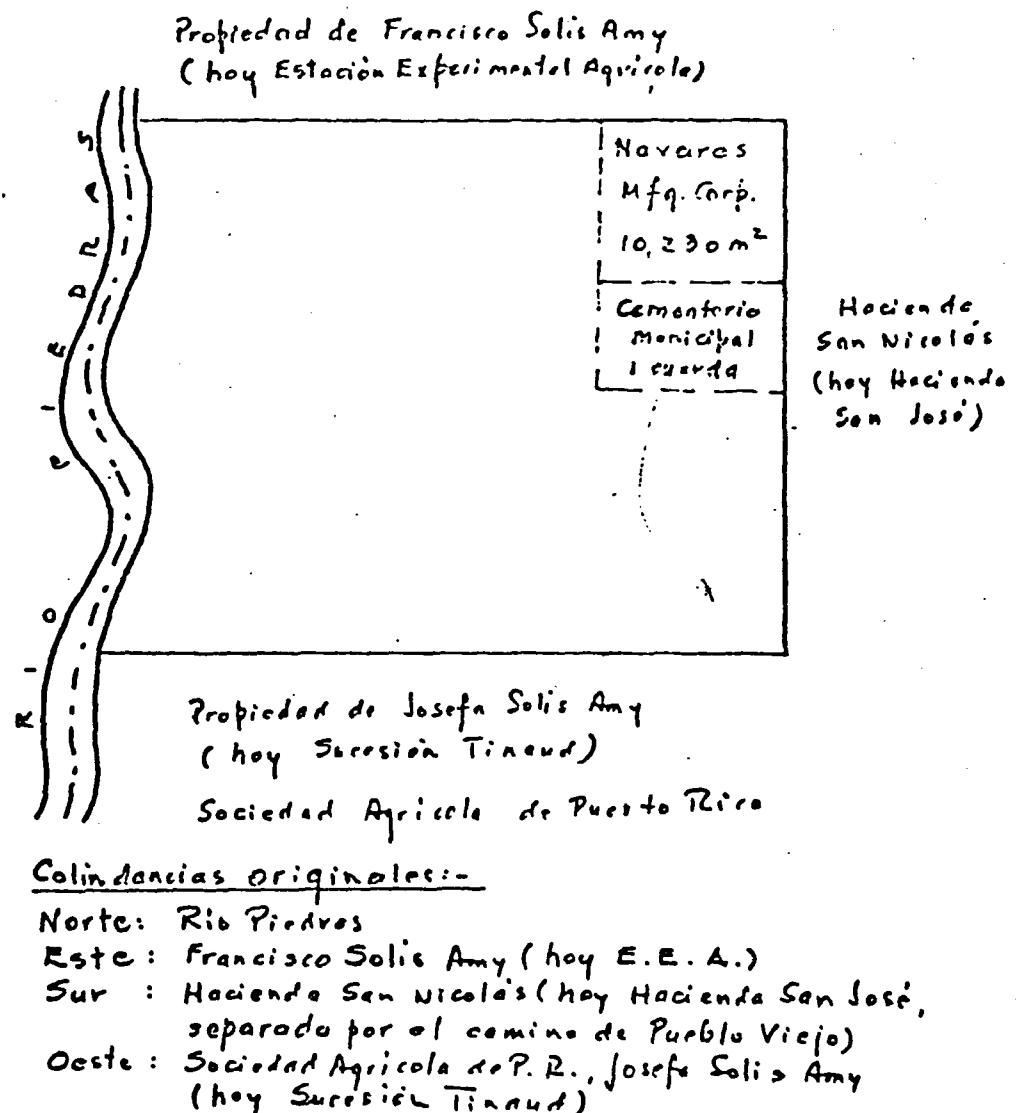
Segregaciones

1. Finca #12,525

FILE #53

Finca "Union"

Cabido - \$1.95 cedulas.



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Folio 56 del Tomo 504 de Rio Piedras

Parcela de 10,230.81 metros cuadrados, el 9 de julio de 1952 para la Compania de Fomento Industrial (Nevares Mfg. Co.).

2. Finca #15,526

Folio 1 del Tomo 412 de Monacillos, Inscripcion 1a.

Parcela de 1,100.32 metros cuadrados (Parcela #1 del Plano de permuto preparado por Figueroa & Rodriguez Inc., el 20 de diciembre de 1957), traspasada al Estado Libre Asociado de Puerto Rico segun Escritura #44 del 4 de septiembre de 1958 ante el Notario Marcos A. Ramirez.

Colindancias:

Norte: Parcela #4 y cauce del rio Piedras
Este : Parcela #1A
Sur : Finca Principal
Oeste: Parcela #2

Inscripcion 3a. y 4a.

Censo sobre las fincas de la Iglesia Catolica Apostolica Romana por herencia de dueno original. Estos censos aparecen cancelados al margen.

Inscripcion 5a.

La Asociacion de Productores de Azucar de Puerto Rico traspasa la finca a El Pueblo de Puerto Rico segun la Escritura #59 en lro. de septiembre de 1914 ante el Notario Jorge V. Dominguez.

Inscripcion 6a.

Segregados 739.564 metros cuadrados (0.188 cuerdas) para formar la Finca #8517, para ser permutados por la Finca #8518 con cabida de 1,337.26 metros (0.34 cuerdas) propiedad de don Etanislao Diaz, segun Escritura #16 en 23 de agosto de 1949 ante el Notario Manuel I. Vallecillo. Inscrita al Folio 115 del Tomo 394 de Rio Piedras, Inscripcion la. Al mismo tiempo se agrupa el remanente de la finca #1014 con la parcela de 1,337.26 metros cuadrados para formar la finca #8519, inscrita al Folio #127 del Tomo 394 de Rio Piedras, inscripcion la. el 31 de octubre de 1949.

Nota:

La finca #8518, con cabida de 1,337.26 metros cuadrados (0.34 cuerdas) fueron segregadas de la Finca #6614, inscrita al Folio 216 del Tomo 122 de Rio Piedras, propiedad de don Etanislao Diaz. Dicha Finca #8518 aparece inscrita en el Folio 121 del Tomo 394 de Rio Piedras, inscripcion la.

FINCA #8519

Inscripcion la.

Folio 127 del Tomo 394 de Rio Piedras.

Finca con cabida de 43.3112 cuerdas, formado por agrupacion del remanente de la Finca #1014 y la Finca #8518 segun Escritura #10 en 23 de agosto de 1949, ante el Notario Manuel I. Vallecillo.

De esta finca se han hecho las siguientes segregaciones:

1. Parcela de 1,189.73 metros cuadrados, inscritas al Folio 133 del Tomo 482 de Rio Piedras, Finca #11,975 Inscripcion la. segun Escritura #31 del 11 de septiembre de 1951 ante el Notario Luis F.

Sanchez Vilella (Vease Certificacion del Consejo de Ensenanza Superior del 23 de junio de 1950).

2. Parcela de 1781.19 metros cuadrados, inscritas al Folio 56 del Tomo 504 de Rio Piedras, Finca #12,525 Inscripcion la. que es agrupada a una parcela de 10,230.81 mestros cuadrados, segregados de la Finca #946 (Finca "La Union") para ser vendido los 12,012.00 metros cuadrados a la Compania de Romento Industrial, que se lo traspasa a Nevarez Mfg. Corp., segun la Escritura #10 del 5 de marzo de 1952 ante el Notario Luis F. Sanchez Vilella (Vease Certificacion #50 del Consejo de Educacion Superior del 7 de abril de 1952).

File #40

FINCA #8519 (antes #1014)

Inscripcion la.

Folio 210 del Tomo 18 de Rio Piedras

Finca compuesta de 50 cuerdas, por agrupacion de la Finca #938 con 45 cuerdas (remanente), inscritas en el Folio 246 del Tomo 16 de Rio Piedras y 5 cuerdas, inscritas en el Folio 193 del Tomo 18 de Rio Piedras.

Vendida a don Francisco Robelido Garcia por don Francisco Solis Amy (hijo de don Joaquin Leandro Solis).

Colindancias:

NORTE: Rio Piedras
ESTE : Rio Piedras
Sur : Miguel Emmanuelli
Oeste: Maria Solis

Segun Segun Escritura #9 de 14 de enero de 1907 ante el Notario Francisco
Socorro Ramos.

Inscripcion 2da.

Folio 212 del Tomo 18 de Rio Piedras

Finca descrita, con cabida de 44.32 cuerdas, habiendose segregado
20,639 metros cuadrados (5.10 cuerdas), vendidos a J. G. White & Co.,
para la Caguas Tramway Co., que atraviesa la finca, lo mismo que la
Carretera Central (#1).

La colindancia Sur varia, siendo ahora con don Miguel Emmanuelli y con
don Santiago F. Lorenzi, separados por la Carretera Central (#1).

Nota Marignal

La segregacion de la parcela vendida a J. G. White & Co., fue de 24,650
metros cuadrados (6.2698 cuerdas), siendo la cabida actual de 43.1592
cuerdas.

Don Francisco Robledo Garcia le vende a la Asociacion de Productores de
Azucar de Puerto Rico, representada por su Presidente don Ramon Aboy
Benitez, por la cantidad de \$35,617.50, junto con otra finca, segun
Escritura # (sic) de 25 de julio de 1910, ante el Notario Francisco Soto
Gras.

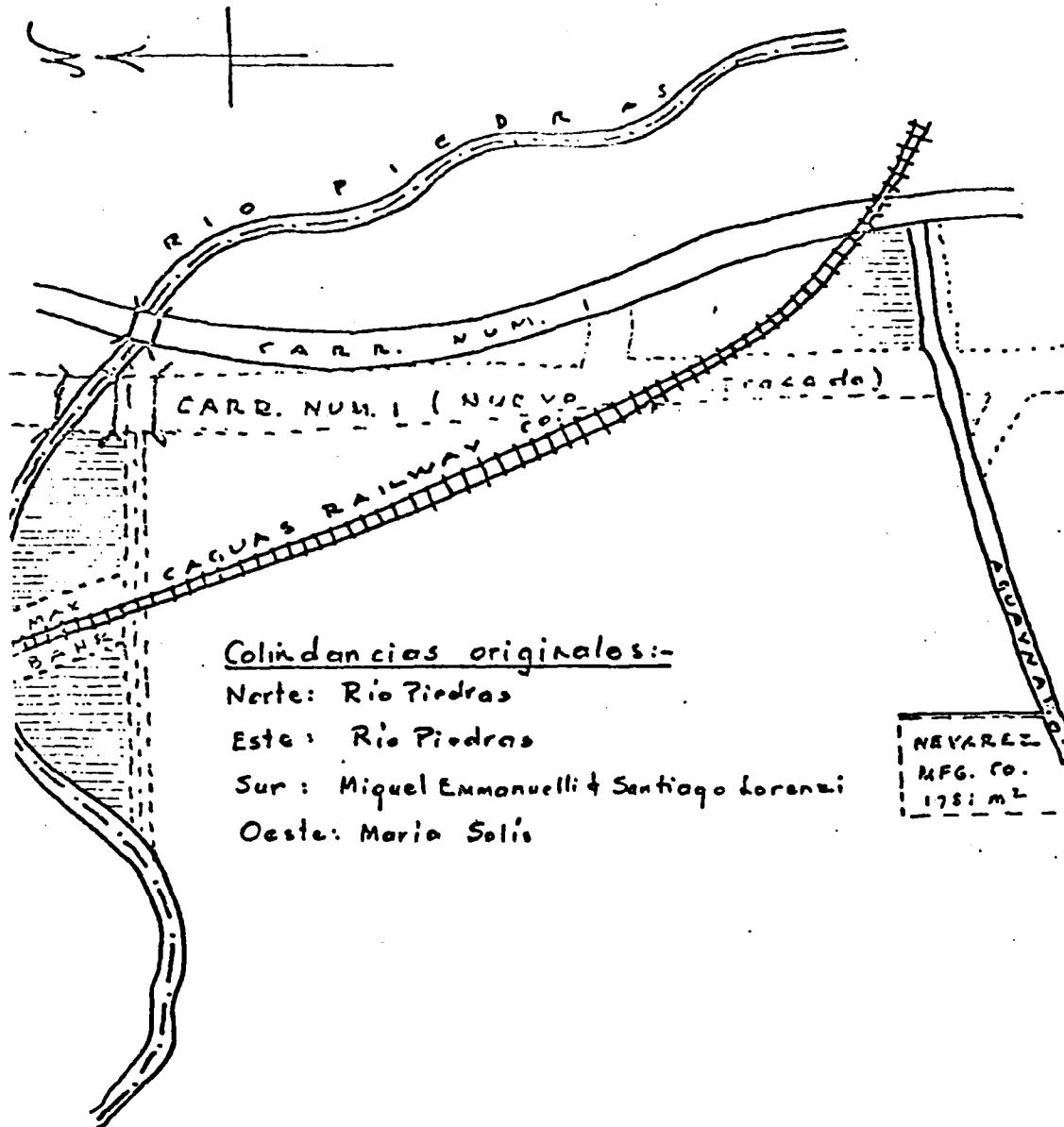
FILE #40A

FINCA #322

Inscripcion 14a.

Folio 219 del Tomo 25 de Rio Piedras (Norte)

FILE #40 - Cabido - ff. 1 cuerdas
Finca "Robledo"



Colindancias originales:-

Norte: Rio Piedras

Este: Rio Piedras

Sur: Miguel Emmanuel & Santiago Lorenzi

Oeste: Maria Solis

Estancia "Mariana", con cabida de 171.12 cuerdas, en Bo. Puente de la Municipalidad de Rio Piedras, traspasada a El Pueblo de Puerto Rico por cession de la Asociacion de Productores de Azucar de Puerto Rico representada por su Presidente don Ramon Aboy Benitez, segun Escritura #59 en 10 de septiembre de 1914 ante el Notario Jorge V. Dominguez.

Inscripcion 15a.

Folio 92 del Tomo 108 de Rio Piedras (Norte)

Traspasada a la Universidad de Puerto Rico por el Comisionado de Agricultura y Comercio de Puerto Rico, don Rafael Menendez Ramos, segun Escritura #4 en 19 de marzo de 1934 ante el Notario Manuel Cruz Horta.

Inscripcion 16a.

La Universidad de Puerto Rico le arrienda a Tropical Forest Experimental Station U.S. Department of Argiculture una parcela con cabida de 5.24 cuerdas por 50 anos, segun Escritura #32 en 28 de noviembre de 1941 ante el Notario Jose F. Camunas.

Inscripcion 17a.

Folio 94 vto. del Tomo 108 de Rio Piedras (Norte)

Servidumbre de 1,759.75 metros cuadrados, a favor de Estados Unidos de America, para la instalacion de una tuberia de agua, inscrita el 26 de julio de 1944. Colindancias: Por el Norte y Sur, con terrenos de la Universidad de Puerto Rico; por el Este, con Jose Rodriguez Collazo; por el Oeste con Central San Jose, Inc.

Inscripcion 18a.

Folio 85 del Tomo 243 de Rio Piedras (Norte)

Dos (2) servidumbres de 4.0 metros cuadrados cada una, a favor de Estados Unidos de America, para la instalacion de tuberia de agua, inscrita el 12 de abril de 1948. Colindando con terrenos de la Universidad de Puerto Rico por los cuatro lados.

Inscripcion 19a.

Traspaso de servidumbre, segun Inscripciones 17a. y 18a., de Estados Unidos de America a Servicio de Acueductos y Alcantarillados de Puerto Rico mediante Escritura #31 en 28 de octubre de 1948 ante el Notario Miguel Parga.

Inscripcion 20a.

Servidumbre de faja de terreno de 5.0 metros de ancho y 400.46 metros de largo a favor de la Autoridad de Acueductos Alcantarillados de Puerto Rico, segun Escritura #11 en 14 de junio de 1962.

Nota:

Se describe la finca con cabida de 168.95 cuerdas y las siguientes colindancias:

NORTE: Ramon Santana (antes Juan Elias Cruz) Manuel Perez y Gobierno de la Capital

ESTE : Gobierno de la Capital (camino Guadalcanal) y Ramon Roig (antes Jose Acosta)

Sur : Quebrada Guadalcanal y Monrique Cabrera

Oeste: Estacion Experimental Agricola y Arturo Roque (antes Central Vannina) y canal de Rio Piedras.

Segregacion

Se segregan 2.1665 cuerdas, inscritas en el Folio 243 del Tomo 578 de

Rio Piedras (Norte), Finca #8,654, Inscripcion la. con las siguientes colindancias:

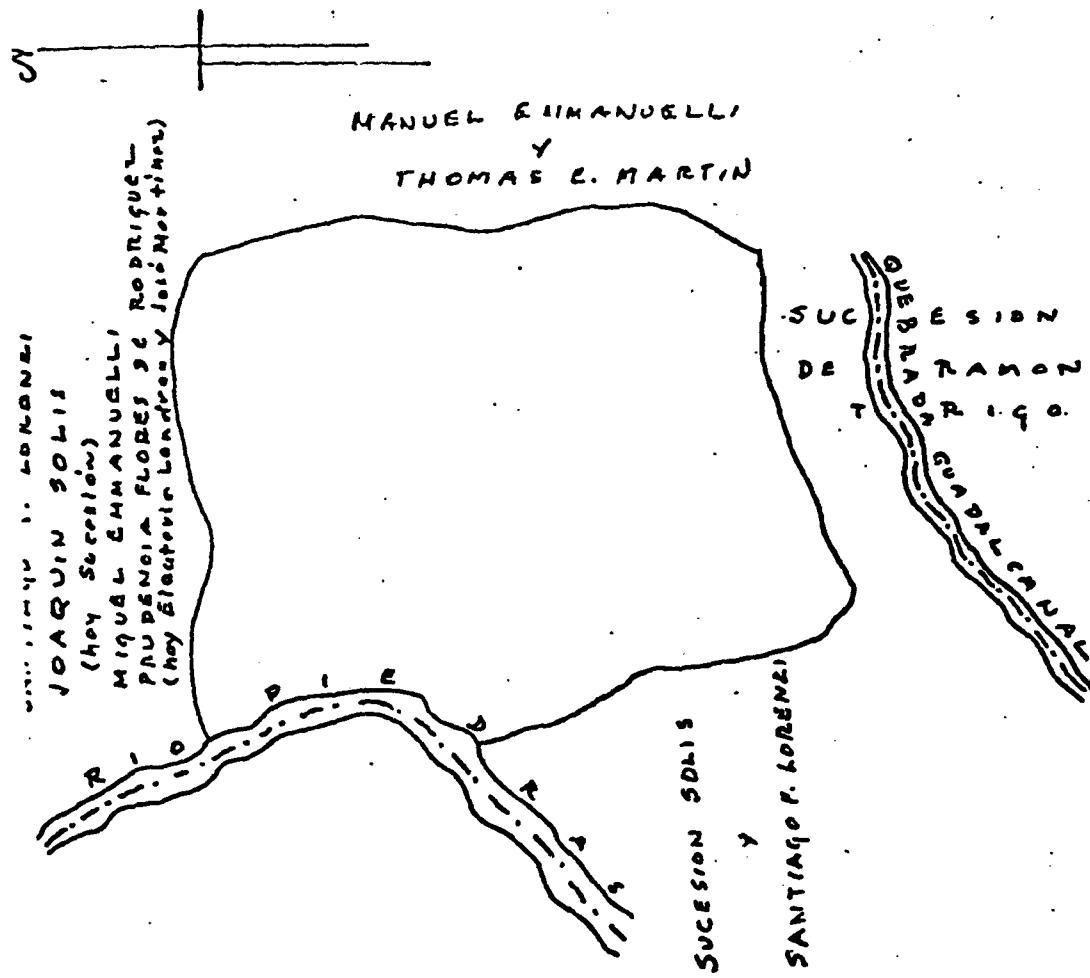
Norte: Sucesion Vicente Lopez, Felix Sandoval, Carlos Rivera Berrios, Modesto Cotto, Ramon Cuadrado y Estacion Experimental Agricola
Este : Carretera Guadalcanal
Sur : Estacion Experimental Agricola
Oeste: Estacion Experimental Agricola

Esta parcela le fue traspasada al gobierno de la Capital para la construccion de una Escuela Elemental, segun Escritura #93 en 14 de julio de 1945 ante el Notario Luis F. Sanchez Vilella.

FILE # 40A

Finca "Mariona"

Cabido - 171.12 hectáreas



Colindancias originales:-

Norte: Santiago F. Lorenzzi, Joaquín Solis (hoy Sucesión), Miguel Emmanuel y Prudencia Flores de Rodríguez (hoy Eleuterio Lendraw), José Martínez
Este: Manuel Emmanuel y Thomas E. Martin
Sur: Ramón Trigo (hoy Sucesión, separados por Querida Guadalcane)
Oeste: Río Piedras, Sucesión Solis y Santiago F. Lorenzzi

APPENDIX G

**Annotated Bibliography of Sources
Available on the Projects at the
San Juan Area Office**

Compiled by

Ernest W. Seckinger, Jr.

Annotated Bibliography of Sources
Available on the Projects at the
San Juan Area Office

PUERTO NUEVO

Aerial Photographs

1936	Unknown scale
1951	1:20,000
1963	Unknown scale
1978	1:4,000

Despiav, B.

1976 Report on the additional subsoil investigation, proposed channelization of Piedras-Puerto Nuevo River and Margarita Creek, Municipality of San Juan, Puerto Rico. Report submitted by Vazquez Agrait and Vazquez Agrait as consulting engineers for Caribbean Soil Testing Co., Inc.

Establishes index properties and subsoil conditions. Core logs. Supplemental to 3 March 1975 report which was not located.

Maps

1972 Land use maps 1:20,000

1978 Topographic maps, 1:4,000 with 1 meter contour interval.
 13 sheets.

USCOE

- 1979 Geotechnical studies for the Puerto Nuevo channelization project. Jacksonville District, EN-MS. Total of 53 pages, most of which are core logs and sieve analyses. Has good introduction to the geologic framework of Puerto Rico.

RIO GRANDE DE LOIZA

Aerial Photographs

- 1977 Total basin 1:12,000

Bronskowski, R. F. and R. H. Cross III

- 1975 Oceanographic and water quality study, Loiza outfall site, Puerto Rico. Alpine Geophysical Associates, Inc., Norwood, NJ. Details the environment and presents oceanographic for just offshore of mouth of Rio Grande de Loiza.

Maps

- 1974 Floodplain Project. 1:4,000, 1 meter contour interval, 5 sheets.

- 1978 Flood boundary and floodway map. Topographic. Flood Insurance Study Presents hypothetical highest expected flood in basin.

Various Dates

in the 1970's

Plan de uso de terrenos de Puerto Rico.

Land use plan. Available for Guraybo, Juncos, San Lorenzo, Las Piedras, Aques Buenas, Cogaus, Canovoes and Loiza.

Various Dates

in the 1970's

Mayas de Zonificacion. Zoning maps for all the municipalities in the basin.

1977 Topographic maps based on March 1977 photography. 6 sheets 1:10,000. Kucera and Associates.

1977 Flood Insurance Study Topographic Maps based on March 1977 photography 1:10,000 and 1:5,000.

USGS, in cooperation with Department of Public Works, Puerto Rico
n.d. Hydrologic Investigations Atlas HA-382. Shows flood prone areas.

Quinones, M. A.

1962 Reconnaissance Report: Loiza River Flood Control Studies.
Report submitted to the Puerto Rico Planning Board.
Rainfall and runoff data, stream profiles and cross sections, topography and soil survey, channel capacities.

1968 Supplementary Report: Loiza River Flood Control Studies.
Report submitted to the Puerto Rico Planning Board.
Presented a new alternative which was not possible in the 1962 report as it would have cut off the Canovanas Central from its fields. By 1968, the Central was closed. The report considers potential lake sites.

Muratti, E.

1968 "Loiza River Floodway Channelization Subsurface Explorations." Efrahim Muratti and Associates. Soils and Foundations Engineers. Appendix to Quinones (1968).

FAJARDO

USCOE Detailed Project Report on the Fajardo River, Puerto Rico.
n.d. Jacksonville District. Report for an earlier flood control project declared not feasible due to b/c ratio.

Maps

n.d.

Hydrologic Investigations Atlas HA-382. USGS in cooperation with the Department of Public Works, Puerto Rico. Shows flood prone areas.

TALLABOA

Aerial Photographs

1977 Blue line photographs, 1:10,000, 3 June 1977. Total River Basin.

Maps

1977 Floodplain Information Study. Topography based on 1 June 1977 photography 1:5,000, 1 meter contour interval, 4 sheets.

n.d. Topography of Tallaboa River Basin. 1:10,000. Prepared from USGS quads.

Ortiz, P.

1979 Subsoil investigations at bridges, sites I and II. Guillermety, Ortiz, and Associates.

SABANA GRANDE

Maps

n.d.

Topography, 1 meter contour interval.